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Feasibility Report for

2019 Hamburg Avenue Improvements

City of Lakeville, MN

City Project No. 19-05
October 15, 2018

Submitted by:
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Certification

Feasibility Report

For

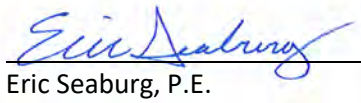
2019 Hamburg Avenue Improvements

City of Lakeville
Lakeville, Minnesota

City Project No. 19-05
Bolton & Menk Project No. T18.116845

October 15, 2018

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

By: 

Eric Seaburg, P.E.
License No. 53712

Date: October 15, 2018

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I. EXECUTIVE SUMMARY

Hamburg Avenue, from Lakeville Boulevard to 202nd Street, is a minor collector roadway that provides access to existing developments and single-family properties. Vital public utilities including sanitary sewer, watermain, and storm sewer also run within Hamburg Avenue, providing service to residents and developments.

The roadway and utility system have been upgraded in sections with development. To date, most of the developable property fronting the roadway has been or is currently being developed.

Hamburg Avenue is programmed in the City's 2018-2022 Capital Improvement Plan as a 2019 construction project. The City Council ordered the preparation of this Report to examine the infrastructure improvements necessary to serve the area into the future, including associated costs and financing.

This Report details the expansion of Hamburg Avenue to a 36' wide roadway with an urban section that includes concrete curb and gutter. Widening would be accomplished with a combination of full-depth-reclamation and full street reconstruction. Other significant infrastructure improvements detailed in this Report include:

- Watermain extension from Hartford Way (N) to 202nd Street
- Trail installation on the east side of Hamburg Avenue from Hartford Way (S) to 202nd Street
- Stormwater basin installation near Lakeville Boulevard

The estimated project costs for the improvements outlined in this Report are **$2,783,645**. A portion of these costs include Hamburg Avenue work that will be done under a Dakota County project to reconstruct 202nd Street from Holyoke Avenue to Cedar Avenue in 2019.

Financing for this project would come from multiple funding sources that include: special assessments, escrow accounts, the City water and sewer operating funds, the City trunk storm sewer fund, the City trunk watermain fund, and the City park dedication fund. This Report has been prepared in accordance with the rules outlined in Minnesota Statutes Chapter 429 allowing for the use of special assessments as a funding source.

Special assessment amounts for this project have been calculated in accordance with the City of Lakeville's special assessment policy. As shown in the Assessment Roll, proposed special assessments include a per unit rate of **$5,457** in areas where watermain is not being installed and **$11,856** in areas where it is.

Upon receipt of this Report, the City Council will need to call for and hold a public hearing to consider the improvements, order the improvements, authorize bidding, declare costs, call for and hold an assessment hearing, and award the construction contract. Construction is anticipated to take place in 2019.

II. INTRODUCTION

The City of Lakeville's 2018-2022 Capital Improvement Plan (CIP) identifies Hamburg Avenue, from Lakeville Boulevard to 202nd Street/CSAH 50 as a 2019 construction project. The City Council authorized the preparation of this Feasibility Report at its July 2, 2018 meeting. This segment of Hamburg Avenue is approximately 4,200 linear feet in length. Approximately 500 linear feet of Hamburg Avenue is proposed to be improved as part of Dakota County's 202nd Street/CSAH 50 reconstruction project, City Project No. 15-12, in 2019. However, discussion of this segment and its associated costs and financing will be discussed in this Report. A depiction of the project extents is shown on Figure 1 in Appendix A.

Hamburg Avenue has received various street and utility improvements associated with adjacent development projects. The extent and type of work completed with each development project is the basis for the infrastructure improvements proposed in this Report.

A. Lakeville Boulevard to 210th Street (Area 1)

   Watermain and sanitary sewer were installed along Hamburg Avenue from Lakeville Boulevard up to and along 210th Street to serve the Lakeville Family Housing 2nd development in 2000.

B. 210th Street to Hartford Way North Junction (Area 2)

   Hamburg Avenue was reconstructed from 210th Street to Hartford Way (N) in 2001/2002 to serve the Village Creek 1st & 2nd developments. This work included watermain, sanitary sewer, and storm sewer installations. Utilities were stubbed to the north to serve future development. The northern section of Hamburg Avenue, from Hartford Way (N) to 202nd Street, was upgraded from a gravel road to a paved road with 2 lifts of bituminous pavement.

C. Hartford Way North Junction to 202nd Street (Area 3)

   Under City Project No. 03-06, sanitary sewer was installed from Hartford Way (N) to 202nd Street to provide sewer service to the existing adjacent residential properties. Services were stubbed to property lines on both sides of the road and the street was repaired as necessary as part of the utility construction.

In addition to the projects described above, the City recently approved the Cedar Landing, Linden Ridge, and Aspen Grove residential development projects. Construction of these developments is underway and/or complete at the time of this Report.

Property development along Hamburg Avenue, a minor collector roadway, is nearly complete. As such, this Report examines long-term improvements to the roadway and utility system necessary to serve the adjacent properties into the future. The improvements discussed in this Report include roadway widening, pavement reconstruction and reclamation, curb and gutter installation, utility extensions, pedestrian improvements, and stormwater management improvements.

A neighborhood meeting was held with the adjacent property owners on June 21, 2018. High level project scope and funding sources were discussed at the meeting. Property owners had an opportunity to comment on the project and ask questions. Overall, those in attendance understood the need for improvements. Residential property owners that front Hamburg Avenue were particularly concerned with assessments, traffic volumes, and traffic speeds. Additional neighborhood meetings will be held throughout the project to allow for further communication with property owners.

III. EXISTING CONDITIONS

A. Streets

Hamburg Avenue is a two-lane, two-way minor collector roadway. It is classified as a Municipal State-Aid Street (MSAS) and is eligible to receive MSAS construction funds. It varies in length, width, age, and typical section. Street improvements have occurred at various times and in various capacities over the last 20 years.

Area 1 experienced utility work and street patching in 2000 as part of the Lakeville Family Housing 2nd development and again in 2014 as part of the Cedar Landing development.

Area 2 was reconstructed in 2001/2002 as part of the Village Creek Development. This Report further breaks Area 2 into Area 2A and Area 2B. Area 2A was constructed to a 24' wide rural section. Area 2B was constructed with the west half constructed to an 18' wide urban section and the east half constructed to a 12' wide rural section.

Area 3 was paved as a rural road in 2002 as part of the Village Creek Development; this upgrade included paving only and did not include any subbase improvements.

Refer to Figure 1 in Appendix A for a depiction of the project areas.

Table 1 and Table 2 below summarize the four distinct street areas based on their existing conditions as as-built data. The Overall Condition Index (OCI) for the corridor ranges from 35-40.

Table 1 – Existing Street Segments

Segment	Limits	Section	Width	Previous Work
Area 1	Lakeville Blvd - 210th Street	Rural	24'-36'	2000/2014
Area 2A	210th Street - Hartford Way (S)	Rural	24'	2001/2002
Area 2B	Hartford Way (S) - Hartford Way (N)	Urban / Rural	30'	2001/2002
Area 3	Hartford Way (N) -202nd Street	Rural	24'	2001/2002

Table 2 – Existing Street Segment As-Built Sections

Segment	Limits	Wear Course	Non-wear Course	Base	Subbase
Area 1	Lakeville Blvd - 210th Street	1.5"	2"	6" CL 5	2' Sand
Area 2A	210th Street - Hartford Way (S)	1.5"	2"	6" RC	2' Sand
Area 2B	Hartford Way (S) - Hartford Way (N)	1.5"	2.5"	9" RC	2' Sand
Area 3	Hartford Way (N) - 202nd Street	1.5"	2"	6" RC	NA

The pavement in Area 1, Area 2A, and Area 2B is approximately 15-20 years old and shows signs of aging consistent with pavements of that age. Normal pavement distresses present include transverse cracking and pavement oxidation. There is little to no rutting, settlement, or longitudinal cracking, indicating the presence of a suitable pavement subbase. The primary maintenance practice for these areas has been crack sealing. Due to the pavement quality, both full-depth reclamation and mill & overlay are suitable rehabilitation practices. These practices will be discussed further in Section IV.

The pavement in Area 3 is approximately 15 years old. It shows significant signs of distress from age that include thermal cracking, longitudinal cracking, pavement patching, and settlement. These distresses are primarily attributed to a pavement section that does not meet current City standards. The primary maintenance in this area has been crack sealing and patching. Due to the pavement quality, full reconstruction is the recommended rehabilitation practice.

A geotechnical report was performed in January 2018 by Braun Intertec, Inc. The geotechnical investigation included 5 soil borings along Hamburg Avenue, with at least one occurring in each street area. The soil boring results indicated an average bituminous thickness of 4.0 inches, average aggregate base thickness of 3.5 inches to 6.0 inches, and a 2' thick sand subbase south of Hartford Way (N).

Generally, soils in the area included combinations of clay and sand. Soil Boring #1 in Area 3 indicated the presence of a 4-foot thick layer of organic material (topsoil).

A combination of reconstruction and reclamation was recommended based on the existing street sections and subsoils. The full geotechnical report can be found in Appendix D.

A sidewalk exists on the east side of Hamburg Avenue in Area 1. A bituminous trail along the north side of Lakeville Boulevard abuts the project on the south end. Concrete sidewalks existing at various intersecting side streets. No other existing pedestrian improvements are located along Hamburg Avenue.

B. Sanitary Sewer

The existing sanitary sewer along Hamburg Avenue was constructed in segments similar to the street improvements discussed above. Table 3 below summarizes the age and type of sanitary sewer present.

Table 3 – Existing Sanitary Sewer Data

Segment	Limits	Pipe Diameter	Pipe Material	Year Built
Area 1	Lakeville Blvd – 210th Street	12-inch	PVC	2000
Area 2A	210 Street – Hartford Way (S)	10-inch	PVC	2001/2002
Area 2B	Hartford Way (S) – Hartford Way (N)	8-inch	PVC	2001/2002
Area 3	Hartford Way (N) – 202nd Street	8-inch	PVC	2003

Based on field inspections performed by City Public Works staff, the sanitary sewer is in very good condition. There are no known deficiencies with the system. However, existing sanitary sewer manholes do not have inflow and infiltration barriers.

C. Water Main

The existing water main along Hamburg Avenue was constructed in segments similar to the street and sanitary sewer segments discussed above. Table 4 below summarizes the age and type of water main present.

Table 4 – Existing Water Main Data

Segment	Limits	Pipe Diameter	Pipe Material	Year Built
Area 1	Lakeville Blvd – 210th Street	12-inch	DIP	2000
Area 2A	210 Street – Hartford Way (S)	12-inch	DIP	2001/2002
Area 2B	Hartford Way (S) – Hartford Way (N)	12-inch	DIP	2001/2002
Area 3	Hartford Way (N) – 202nd Street	None Existing		

Based on field inspections performed by City Public Works staff, the water main system is in very good condition. There are no known deficiencies with the system.

D. Storm Sewer

The majority of Hamburg Avenue is a rural section. Therefore, stormwater runoff is generally conveyed via roadside swales and private driveway culverts from 202nd Street towards Lakeville Boulevard where it eventually enters South Creek.

Improvements made to Area 2 in 2001/2002 included the installation of curb and gutter and

storm sewer on the west side of the roadway. The storm sewer was installed from Hartford Way (S) to Hartford Way (N). It collects and conveys drainage from Area 2, Area 3 and the Village Creek development. Storm water is piped to a stormwater basin in the Village Creek development, and then to a series of downstream stormwater basins before entering South Creek.

Based on field inspections performed by City Public Works staff, the storm sewer system is in very good condition. There are no known deficiencies with the pipe, catch basins, or manholes.

IV. PROPOSED IMPROVEMENTS

A. Street

Hamburg Avenue is proposed to be reconstructed/reclaimed in accordance with the City of Lakeville's collector road standards. The roadway width is proposed to be widened to 36 feet in accordance with State-Aid requirements for a minor collector roadway. The proposed street section includes a 24-inch sand subbase, 6-inch aggregate base, and 4-inch bituminous pavement as shown in Figure 2 in Appendix A.

As discussed in Section III, Area 1 and Area 2 have pavement sections with an age and base that support both a full-depth reclamation and mill & overlay as a pavement rehabilitation method.

However, pavement widening in these areas makes mill & overlay a less suitable option. This approach would rehabilitate the existing pavement area while the widened areas would receive new pavement. Longitudinal cracking would be expected between the existing and widened pavements within 1-3 years of construction, resulting in the need for long-term crack sealing maintenance. Additionally, the pavements would have differing long-term rehabilitation cycles.

In contrast, Area 1 and Area 2 are also candidates for full-depth reclamation. FDR would grind, pulverize, and mix the existing 6-inch aggregate base with the existing 4-inch bituminous pavement. This mixture will be directly re-used as aggregate base. The top 4 inches can be salvaged and used as aggregate road base in the widened pavement areas. The entire street area would receive two new lifts of bituminous pavement. This rehabilitation approach would effectively create a newly reconstructed street from curb to curb with a single pavement maintenance program applying to the roadway. As such, full-depth reclamation is recommended for these areas. Further analysis of the existing recycled concrete aggregate base is recommended during final design to ensure that the in-place material is suitable for mixing and reuse.

As discussed in Section III, Area 3 shows signs of distress consistent with a pavement section built without a suitable subbase. Additionally, soil borings indicate the presence of un-suitable subbase material (buried topsoil). The construction of new watermain in this area will significantly disturb and mix in-place soils. As such, full pavement reconstruction is recommended in this area.

All areas will receive new B618 concrete curb and gutter where existing curb and gutter does not exist.

A summary of the roadway improvements is shown in Figure 3 in Appendix A.

Traffic calming measures have been evaluated as part of this Report; these measures must balance the demands of the roadway users, safety of pedestrians, safety of City maintenance staff, and long-term operation and maintenance costs.

Reducing lane widths is a measure shown to provide a traffic calming effect. As such, pavement markings have been identified as a viable traffic calming measure for this project. In an effort to calm traffic and increase driver awareness, lane widths along Hamburg Avenue will be striped at 11 feet wide instead of 12-foot wide, which is allowable under state statute for low volume, low speed roadways.

While posted speeds alone have not been shown to have a significant effect on traffic calming, they do provide law enforcement the opportunity to restrict speeds with targeted enforcement. As such, posted speeds in the project area are proposed to remain the same. Area 1 and Area 3 will be posted at 30 MPH and Area 2 will be posted at 40 MPH.

On-street parking will need to be restricted in all areas due to inadequate shoulder widths, in

accordance with State statutes. Parking restrictions must be approved by council resolution prior to project approval by MnDOT State-Aid.

Dakota County, in cooperation with the City of Lakeville, is reconstructing and widening 202nd Street (CSAH 50) in 2019 as part of City Project No. 15-12. This effort includes significant grade changes at the intersection of 202nd Street and Hamburg Avenue. The County project will reconstruct approximately 500 feet of the southern leg of the intersection (Hamburg Avenue). Draft construction plans were reviewed during the preparation of this Report. Proposed improvements discussed in this Report include connections to both the street and utility systems planned as part of the County project. Additional coordination is recommended as part of the final design of Hamburg Avenue. Excess material from the Dakota County project in the amount of 8,200 CY was estimated to be used as common borrow during construction of Hamburg Avenue. Coordination of the material exchange will be required during final design.

Existing street signs will be examined during final design to determine if they can be salvaged and reinstalled. New street signs will be installed as necessary.

Existing roadside mailboxes will be salvaged and reinstalled as part of the project. During construction, the Contractor will be responsible for establishing and maintaining a temporary mailbox bank for residents to use.

B. Sanitary Sewer

Generally, all existing manholes will be adjusted to fit the profile of the new roadway. Adjustments will include the replacement of adjusting rings and the installation of I/I barriers as necessary. In areas where roadway widening will increase the surface grade by over 6 inches, structure adjustments may include the addition of barrel sections to achieve the desired rim elevation.

A summary of all preliminary utility improvements is shown in Figure 4 in Appendix A.

C. Water Main

Improvements to the water main system will occur in Area 3 where no water main exists. The City's current Water Plan identifies 12-inch diameter water main extended through Area 3 to 202nd Street. As such, this project proposes the extension of 12-inch diameter polyvinyl chloride (PVC) water main pipe from Hartford Way (N) to 202nd Street. Water main services will be provided to the adjacent residential properties, including future development parcels, and to the Aspen Grove development.

D. Storm Sewer

The existing storm sewer structures will be adjusted to fit the profile of the new roadway. Adjustments will include the replacement of adjusting rings as necessary. Existing catch basin leads that were previously stubbed for future road widening will be extended to proposed curb lines.

In order to capture the runoff created from the widened/urbanized roadway, new storm sewer will be installed in all areas where storm sewer does not currently exist. Generally, storm sewer will run from 202nd Street to Lakeville Boulevard before discharging into a stormwater management basin and then into South Creek. Bypass piping is proposed south of the Village Creek Townhome stormwater basin to direct more of the Hamburg Avenue drainage southward to the proposed stormwater management basin.

Existing private driveway culverts and roadside swales in Area 3 may need to be relocated and/or replaced depending on final construction limits identified in final design. Construction cost estimates in this Report assume that all culverts will be replaced.

E. Stormwater Management

The proposed roadway improvements will result in an increase in impervious surface and a subsequent increase in stormwater runoff volume and rate. Conversion from a rural section to an urban section also impacts the overall management of stormwater by reducing the available watershed storage in ditch areas, reducing the time of concentration of stormwater runoff by using pipe for conveyance, and concentrating discharge at single outflow points. Therefore, critical attention has been given to changes in stormwater conveyance and analysis of existing ponding areas to understand the overall impact of the surface improvements. The following critical stormwater management solutions are proposed.

1. Village Creek Townhome Stormwater Basin (Village Creek 3rd)

   Atlas 14 rainfall depths and MSE 3 rainfall distributions were used to accurately represent the rainfall intensity and decreases in overall storm duration. The Village Creek townhome complex has a wet sedimentation basin to treat stormwater from the townhome development area as well as a portion of Hamburg Avenue. According to Atlas 14 rainfall data, the basin has limited ability to contain the entire 100-year (1% probability) rainfall event as compared to the previous Technical Paper 40 (TP-40) rainfall depths.

   A portion of the Hamburg Avenue storm sewer discharges into the basin, and the outfall ties back into the Hamburg Avenue public storm sewer. To relieve pressure to the basin, an 18-inch diameter reinforced concrete pipe (RCP) is proposed to be constructed between these connection points. Table 5 describes the reduction in water surface elevation. While the proposed 18" RCP diversion does not completely mitigate the peak inflow and water surface elevation to the existing TP-40 condition, the peak inflow and water surface elevation is reduced compared to the existing Atlas 14 condition.

   Dead storage and correlating water quality capacity of the Village Creek Townhome basin was not analyzed as part of this Report.

Table 5 – Summary of Hydraulic Conditions at Village Creek Basin (Village Creek 3rd Addition)

Condition	100-Year Peak Inflow (cfs)	100-Year Peak Water Surface Elevation (ft)
Existing - TP-40	81.7	968.4
Existing - Atlas 14	114.8	968.8
Proposed - Atlas 14	98.6	968.5

2. Proposed Water Quality and Rate Control Feature

   A basin was preliminarily designed on the south side of the project, west of Hamburg Avenue in the existing parcel shown in Figure 5 in Appendix A. The basin will accommodate volume control, total suspended solids and total phosphorus reduction requirements and restrict rate control to the existing condition for the 2-, 10- and 100-year rainfall events.

   The basin is recommended to be a bio-infiltration basin including the following primary design components.

   - Pretreatment forebay designed per the Minnesota Pollution Control Agency (MPCA) Stormwater Manual requirements.
   - Bio-infiltration design including native plantings.
   - Excavation of a minimum of 3 feet of native soil from the proposed bottom of pond and replacement with an engineered soil blend including sand, topsoil and

compost.

- Drain tile and knife valve as a backup drainage system is optional, assuming the ultimate soils are conducive to infiltration. The City may wish to add this during final design.
- Primary overflow structure in the basin to discharge high flows.
- 18" RCP bypass pipe to divert flows larger than approximately the 1-year rainfall event to the south directly into South Creek. This will help reduce the volume of inflow to the bio-infiltration basin, ensure a 48-hour drawdown, limit peak discharge rates into South Creek, extended the lifecycle, and reduce life-cycle costs.

The total new impervious area for the roadway and trail improvements is approximately 35,900 square feet. The City designed additional capacity in the basin to accommodate future development from approximately 6.0 acres of medium density residential (assumed 35% impervious), which equates to an additional 92,000 square feet of new impervious.

The City of Lakeville requires 1.5 inches of volume control over the newly constructed impervious area in the South Creek subwatershed. The volume control requirement for the new residential and Hamburg Ave improvements is approximately 11,500 cubic feet. The total required water quality volume for the road way, trail and future residential is 16,000 cubic feet. The preliminary basin contains 32,600 cubic feet of potential infiltration capacity below the primary outlet. The additional infiltration capacity includes accommodations for rate control. In other words, the additional pond foot print required to meet rate control standards results in additional water quality volume. The City may wish to lower the outlet of the pond to minimize the infiltration volume, but the preliminary basin configuration described herein meets water quality and rate control standards.

The basin will be constructed in a Zone AE FEMA designated floodway, and partially in the flood fringe. Dakota County currently maintains the FEMA approved HEC-2 hydraulic models. A cursory review of the digital mapping information indicated that a modeled cross section exists just upstream of the Hamburg Ave/Lakeville Blvd culvert crossing. Therefore, the cross section could be simply modified to determine the effects on the flood elevation. Upon final design, it is recommended that the City further assess the addition of conveyance at this particular location and secure a letter of confirmation from the County and MnDNR supporting a LOMR and/or No-Rise certification.

F. Pedestrian

In accordance with the City's current Parks, Trails & Open Space Plan (2015), an 8-foot wide City trail is being proposed on one side of Hamburg Avenue. Trail connections will be made at Lakeville Boulevard and 202nd Street. Sidewalk connections will be made at intersecting streets where sidewalk currently exists.

Curb cuts and pedestrian ramps will be provided at Hamburg Avenue intersections where pedestrian facilities cross, in accordance with the Americans with Disabilities Act (ADA) standards. However, in accordance with MnDOT Technical Memorandum No. 15-01-T-01, crosswalk pavement markings will not be provided, as the peak demand of 20 pedestrians per hour is not forecasted for the 40 MPH street crossings. Marking crosswalks when unwarranted creates a situation where pedestrian/vehicle incidents can actually increase. Crosswalk pavement markings can easily be added in the future should peak pedestrian demands warrant them.

V. PERMITS

In order to construct the proposed improvements described in this Report it will be necessary to obtain the following permits prior to the start of construction:

- Minnesota Department of Health (MDH) for water system
  - For water main installation between Hartford Way and 202nd Street
- Minnesota Pollution Control Agency (MPCA) for stormwater
  - NPDES/SDS Construction Permit would be needed since disturbing over 1 acre
- Dakota County
  - Permit may be needed for work that ties into CSAH 50 reconstruction project
- Minnesota Department of Natural Resources (DNR)
  - Letter of Map Revision (LMOR) or No-Rise Certification for work in flood plain

VI. EASEMENTS

All proposed street and utility improvements to Hamburg Avenue would be located within existing public right-of-way or City-owned property. No permanent or temporary easements are anticipated to be needed for the proposed roadway or utility construction.

For various work items, minor encroachment onto private property may be beneficial in order to achieve a better overall quality of work. It is assumed that project staff will discuss these with property owners and obtain right-of-entries on a case-by-case basis. These items include:

- Water service and curb box installation
- Driveway connections
- Culvert repairs
- Drainage swale grading and reestablishment

The stormwater management feature is proposed to be located outside of available right-of-way. As such, permanent and temporary easements will be required to facilitate its construction. It is recommended that project staff coordinate with the impacted property owner during final design to negotiate an easement agreement that satisfies the needs of both parties.

VII. ESTIMATED COSTS

Detailed estimates of probable construction costs have been prepared for the improvements described in this Report and are included in Appendix B. All costs are based on anticipated unit prices for the 2019 construction season. Table 6 below is an overall summary of the estimated project costs and includes a 5% contingency and 28% allowance for engineering, legal, administrative, and finance costs.

Table 6 – Estimated Project Costs

Proposed Improvements	City Project	County Project	Total Project Costs
Street	$1,224,627	$191,027	$1,415,654
Curb and Gutter	$99,268	$16,451	$115,718
Trail	$144,197	$14,448	$158,645
Storm Sewer	$357,868	$38,553	$396,421
Water Main & Sanitary Sewer	$121,249	$94,255	$215,504
Stormwater BMP	$481,703	$0	$481,703
Total Project Costs	**$2,428,912**	**$354,733**	**$2,783,645**

VIII. COST ALLOCATION

It is proposed that the project costs be assessed to the benefitted properties utilizing the City's current assessment policy, which requires 40% of street and storm sewer costs be assessed. It also requires 100% of all project costs related to the following items be assessed to benefitting properties:

- Installation of new curb and gutter
- Installation of new water main and services, not including trunk upsizing

The City would be responsible for the remaining project costs, including 100% of the proposed storm water BMP and 100% of the proposed trail, consistent with City policy.

Many of the parcels and developments along Hamburg Avenue have previously paid escrows for future improvements to improve Hamburg Avenue as part of their development(s). As such, parcels eligible to be assessed as part of this project include three parcels on the west side of Area 1 and Area 2A and fourteen parcels abutting Area 3. A depiction of the assessable parcels with their associated parcel number is shown in Figure 6 in Appendix A.

Assessments on this project will be on a per unit basis with all parcels receiving a minimum of one unit assessment. Larger parcels that can be developed will be assessed additional units in accordance with the City's special assessment policy. Table 7 below summarizes the adjacent front footage to the project and number of assessable units allocated for each parcel.

Table 7 – Parcel Front Footage and Assessable Unit Summary

Parcel #	Parcel ID	Owner	Adjacent Frontage	Assessable Units
1*	220330025011	Northern States Power	205 LF	3
2*	220280054010	Northern States Power	305 LF	4
3*	220280053072	Minneapolis Meeting Rooms	357 LF	5
4	224780001121	Kimberly Perila-Schlink	127 LF	1
5	224780001110	Robert W Brick	95 LF	1
6	224780001101	Scott L & Melissa R Marsyla	95 LF	1
7	224780001090	Vitaliy & Liya Skladanovskiy	95 LF	1
8	224780001083	Joseph E Mueller	95 LF	1
9	224780001074	Teresa Byrne	95 LF	1
10	224780001073	Andrew G Rundell	95 LF	1

11	224780001072	Timothy M Degross	95 LF	1
12	224780001040	Jon W & Debra L Malin	95 LF	1
13	224780001030	Victoria Balogh	95 LF	1
14	224780001021	Mark & Timoth Haglund	125 LF	1
15	224780001010	Dakota County	161 LF	1
16	220280004020	Roger & Dianne Piekarski	241 LF	2
17	220280004010	Gervase J Langer & Christine Zweber	492 LF	4
Totals:			**2868 LF**	**30**

* Note – Parcels 1-3 already have watermain installed adjacent to their property and will therefore not be assessed for watermain improvements.

A. Assessable Costs

The Total Project Costs shown in Table 6 can be further broken down into Assessable Project Costs, as certain construction items that are included in the total cost estimate are not directly related to improvements that are assessable. Table 8 below outlines the Assessable Costs that are used in the calculation of property assessments.

Table 8 – Assessable Project Costs

Proposed Improvements	**Assessable Costs**
Street	$460,172
Curb and Gutter	$115,718
Storm Sewer	$366,114
Water Main	$115,181
Totals:	**$1,057,185**

Consistent with the City's Assessment Policy, the assessable parcels in this project are only responsible for costs equivalent to a 32' wide street as measured from back of curb to back of curb. As such, a deduction of **$93,941** was made to the assessable street costs.

The proposed watermain improvements in Area 3 include a 12-inch diameter watermain. Consistent with the City's Assessment Policy, the assessable parcels in this area are only responsible for lateral watermain costs equivalent to that of an 8-inch diameter watermain. As such, a deduction of **$24,998** was made to the assessable watermain costs.

B. Assessment Calculations

Assessments are calculated by identifying the total assessable project costs, identifying the fraction of project costs attributable to the assessable parcels (ratio of assessable front footage versus total project front footage), multiplying by the assessment ratio per the City assessment policy, and dividing by the total number of units. This calculation has been performed in Tables 9-12 below. The watermain calculation in Table 12 does not include a front footage ratio because all the project's assessable watermain costs are adjacent to those assessable parcels.

Table 9 – Street Assessment Calculation	
Total Street Assessable Costs	$460,172
Fraction of Total Project Front Footage Assessed	36.69%
Fraction of Assessable Street Costs Assessed	$168,834
Assessment Ratio Per Policy	40%
Assessed Street Costs	$67,533
Assessable Units	30
Street Assessment Per Unit	**$2,251**

Table 10 – Curb and Gutter Assessment Calculation	
Total Curb and Gutter Assessable Costs	$115,718
Fraction of Total Project Front Footage Assessed	36.69%
Fraction of Curb and Gutter Costs Assessed	$42,456
Assessment Ratio Per Policy	100%
Assessed Curb and Gutter Costs	$42,456
Assessable Units	30
Curb and Gutter Assessment Per Unit	**$1,415**

Table 11 – Storm Sewer Assessment Calculation	
Total Storm Sewer Assessable Costs	$366,114
Fraction of Total Project Front Footage Assessed	36.69%
Fraction of Storm Sewer Costs Assessed	$134,324
Assessment Ratio Per Policy	40%
Assessed Storm Sewer Costs	$53,730
Assessable Units	30
Storm Sewer Assessment Per Unit	**$1,791**

Table 12 – Watermain Assessment Calculation	
Total Watermain Assessable Costs	$115,181
Assessment Ratio Per Policy	100%
Assessed Watermain Costs	$115,181
Assessable Units	18
Watermain Assessment Per Unit	**$6,399**

C. Assessment Roll

Each of the individual assessment rates (Street, Curb and Gutter, Storm Sewer, and Watermain) from the previous sections are multiplied by the number of assessable units for each parcel and summed for a Total Assessment amount. The Assessment Roll shown in Table 13 is a summary of the proposed assessments for this project.

Table 13 – Assessment Roll

Parcel	Owner	Units	Street Assessment	Curb and Gutter Assessment	Storm Sewer Assessment	Watermain Assessment	Total Assessment
1	Northern States Power	3	$6,753.35	$4,246	$5,373	-	**$16,372**
2	Northern States Power	4	$9,004	$5,661	$7,164	-	**$21,829**
3	Minneapolis Meeting Rooms	5	$11,256	$7,076	$8,955	-	**$27,287**
4	Kimberly Perila-Schlink	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
5	Robert W Brick	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
6	Scott L & Melissa R Marsyla	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
7	Vitaliy & Liya Skladanovskiy	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
8	Joseph E Mueller	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
9	Teresa Byrne	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
10	Andrew G Rundell	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
11	Timothy M Degross	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
12	Jon W & Debra L Malin	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
13	Victoria Balogh	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
14	Mark & Timoth Haglund	1	$2,251	$1,415	$1,791	$6,399	**$11,856**
15	Dakota County	1	-	-	-	-	**-**

16	Roger & Dianne Piekarski	2	$4,502	$2,830	$3,582	$12,798	**$23,712**
17	Gervase J Langer & Christine Zweber	4	$9,004	$5,661	$7,164	$25,596	**$47,425**
Totals:		**30**	**$65,282**	**$41,041**	**$51,939**	**$108,782**	**$267,044**

IX. ASSESSMENT AND FINANCING SUMMARY

Based on the cost allocation previously described, a summary of the assessable costs versus city costs are outlined in Table 14 below with their associated funding source.

Table 14 – Assessment and Financing Summary

Proposed Improvements	Assessed Costs	City Costs	Total Costs	Funding Source(s)
Street	$65,282	$1,350,372	$1,415,654	Bonds, Escrow & Assessments
Curb and Gutter	$41,041	$74,677	$115,718	Bonds, Escrow & Assessments
Trail	$0	$158,645	$158,645	Park Dedication
Storm Sewer	$51,939	$344,482	$396,421	Trunk Storm Sewer & Assessments
Water Main & Sanitary Sewer	$108,782	$106,722	$215,504	Water & Sewer Operating, Trunk Water & Assessments
Stormwater BMP	$0	$481,703	$481,703	Trunk Storm Sewer
Totals:	**$267,044**	**$2,516,601**	**$2,783,645**	

X. PUBLIC HEARING

In order to consider the use of assessments for financing a portion of the 2019 Hamburg Avenue Improvement Project, Minnesota Statutes, Chapter 429, requires two public hearings be held regarding the project.

A summary description of the two required hearings is provided below. Additional information regarding the hearings is contained in the City of Lakeville's Special Assessment Policy.

A. Improvement Hearing

The first public hearing is referred to as the "Improvement Hearing", and is called when the Feasibility Report has been completed and is ready to be presented to the City Council. Notice of the hearing is required to be made to the general public, as well as specifically to those parcels proposed for assessment.

The information in the Feasibility Report is presented at the improvements hearing, including the estimated project costs and the estimated assessments. After the hearing is closed, if the City wishes to proceed with the project, the City Council then takes action to officially order the improvements.

B. Assessment Hearing

The second public hearing is referred to as the "Assessment Hearing". The purpose of the assessment hearing is to present the actual assessment roll to the properties proposed to be assessed. Specific notice of the hearing is required to be directly sent to those properties proposed for assessment; notice must also be made to the general public.

To prepare for the assessment hearing, the City must have the final assessment roll prepared with the actual assessment proposed to be levied against the properties. This differs from the improvement hearing, where only the estimated assessments were presented. Preparation of the final assessment roll must be based on actual costs from construction bids received. Minnesota Statute allows the assessment hearing to be held either before the award of the contract and start of construction, or after construction has been completed.

XI. PROJECT SCHEDULE

The proposed project schedule is shown below:

Neighborhood Informational Meeting (Completed)	June 21, 2018
Resolution Ordering Preparation of Feasibility Report (Completed)*	July 2, 2018
Receive Feasibility Report*	October 15, 2018
Order Public Hearing for Improvements*	October 15, 2018
Public Hearing for Improvements*	November 19, 2018
Order Improvements, Authorize Preparation of Plans and Specifications*	November 19, 2018
Approve Plans and Specifications, Authorize Ad for Bid, Set Bid Date*	January 21, 2019
Bid Opening	February 27, 2019
Declare Costs and Set Assessment Hearing*	March 18, 2019
Neighborhood Meeting – Present Project and Assessment Amounts	April 11, 2019
Assessment Hearing, Award Contract*	April 15, 2019
Begin Construction	May 2019
Substantial Completion	Fall 2019

* Denotes City Council Meeting Item

XII. FEASIBILITY AND RECOMMENDATION

This Report has been prepared to investigate the potential for making improvements to the existing Hamburg Avenue corridor, extensions of public utilities to new service areas, and improvements to stormwater management practices as necessary to serve the roadway corridor and future development.

This Report has identified the recommended improvements to the infrastructure, provided estimated costs of the recommended improvements, and identified a method of cost allocation, consistent with the City of Lakeville's adopted Special Assessment Policy, to finance the improvements.

From an engineering standpoint, this project is feasible, cost effective, and necessary due to the condition of the existing infrastructure and demand for new infrastructure. It is also feasible from a construction standpoint, with a detailed schedule presented for completion of the work in 2019.

Appendix A: Figures

Hamburg Avenue
City of Lakeville

Figure 1- Location Map
October 2018

BOLTON & MENK

Hartford Way
Hartford Way
202nd Street (CSAH 50)
VILLAGE CREEK
Hamburg Avenue
Hamburg Avenue
Lakeville Blvd
210th Street
SPRUCE PLACE
CEDAR LANDING
LINDEN RIDGE
205th Street
ASPEN GROVE

PROJECT AREAS

- AREA 1
- AREA 2A
- AREA 2B
- AREA 3
- BY OTHERS

0 200 400
HORZ. SCALE FEET

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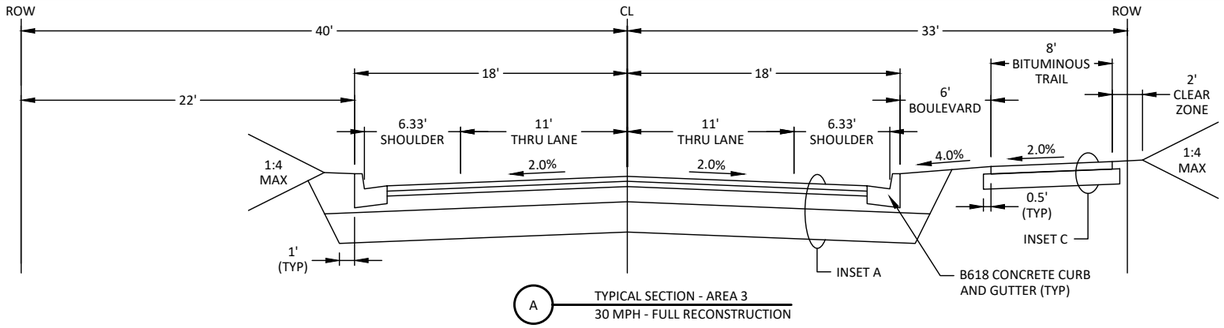
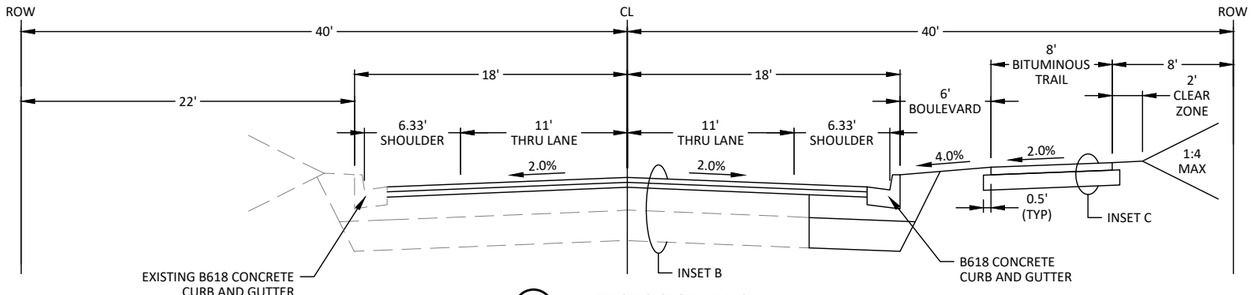
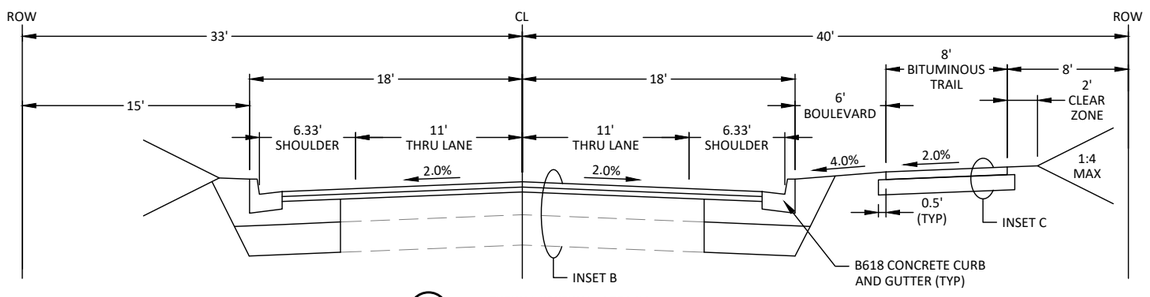


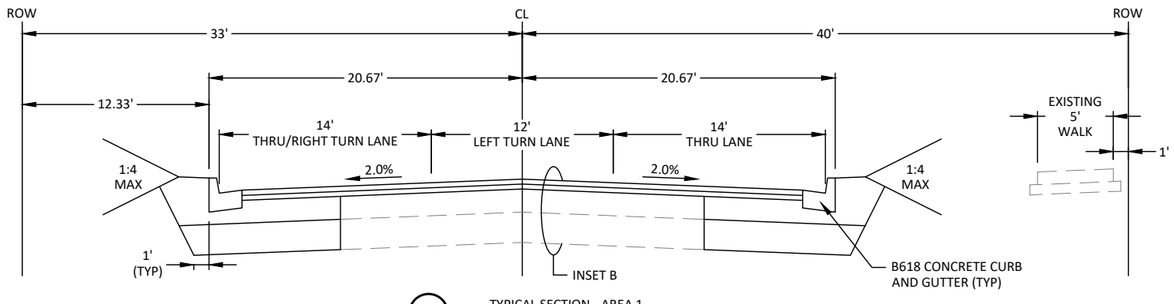
A TYPICAL SECTION - AREA 3
30 MPH - FULL RECONSTRUCTION



D TYPICAL SECTION - AREA 2B
40 MPH - FULL DEPTH RECLAMATION WITH WIDENING TO EAST

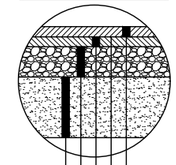


E TYPICAL SECTION - AREA 2A
40 MPH - FULL DEPTH RECLAMATION WITH WIDENING BOTH SIDES



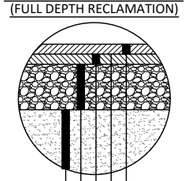
C TYPICAL SECTION - AREA 1
40 MPH - FULL DEPTH RECLAMATION WITH WIDENING BOTH SIDES FOR TURN LANE

INSET A - BITUMINOUS STREET
(FULL RECONSTRUCTION)



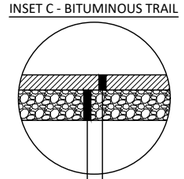
2" - TYPE SP 12.5 BITUMINOUS WEARING COURSE MIXTURE (3,C) [SPWEB340C]
BITUMINOUS TACK COAT
2" - TYPE SP 12.5 BITUMINOUS NON-WEARING COURSE MIXTURE (3,C) [SPNWB330C]
6" - CLASS 5 AGGREGATE BASE (100% CRUSHED)
24" - SELECT GRANULAR BORROW

INSET B - BITUMINOUS STREET
(FULL DEPTH RECLAMATION)



2" - TYPE SP 12.5 BITUMINOUS WEARING COURSE MIXTURE (3,C) [SPWEB340C]
BITUMINOUS TACK COAT
2" - TYPE SP 12.5 BITUMINOUS NON-WEARING COURSE MIXTURE (3,C) [SPNWB330C]
6" - RECLAIMED MATERIAL
EXISTING GRANULAR SUBGRADE

INSET C - BITUMINOUS TRAIL



3" - TYPE SP 9.5 BITUMINOUS WEARING COURSE MIXTURE (2,B) [SPWEA240B]
6" - CLASS 5 AGGREGATE BASE (100% CRUSHED)

Hamburg Avenue
City of Lakeville

Figure 3 - Street Improvements
October 2018

BOLTON & MENK

Lakeville Boulevard
8090
Hartford Way
Hampshire Way
Hamburg Avenue
SEE BELOW
20575
20567
210th Street
Hampshire Way
Hartford Way
202nd Street
20508
20507
20483
20469
20449
20437
20425
20405
20395
20355
20327
20305
20281
Hamburg Avenue
SEE ABOVE
SEE ABOVE
20567
20559
20551
20543
20535
20527
20519
20511
20503
7975
20400
20200
205th Street

LEGEND

- FULL RECONSTRUCTION
- FULL DEPTH RECLAMATION WITH WIDENING TO EAST
- FULL DEPTH RECLAMATION WITH WIDENING BOTH SIDES
- BITUMINOUS TRAIL
- CONCRETE SIDEWALK
- APPROXIMATE GRADING LIMITS

0 70 140
SCALE FEET

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Hamburg Avenue
City of Lakeville

Figure 4 - Utility Improvements
October 2018

BOLTON & MENK

Lakeville Boulevard
210th Street
Hartford Way
Hampshire Way
202nd Street
205th Street
Hamburg Avenue
8090
20508
20507
20483
20469
20449
20437
20425
20405
20395
20355
20327
20305
20281
20575
20567
20559
20551
20543
20535
20527
20519
20511
20503
7975
20400
20200
SEE ABOVE
SEE BELOW

LEGEND

	EXISTING	PROPOSED
SANITARY SEWER	> >	>
WATERMAIN	I I	I
STORM SEWER	>>	>>

0 100 200
SCALE FEET

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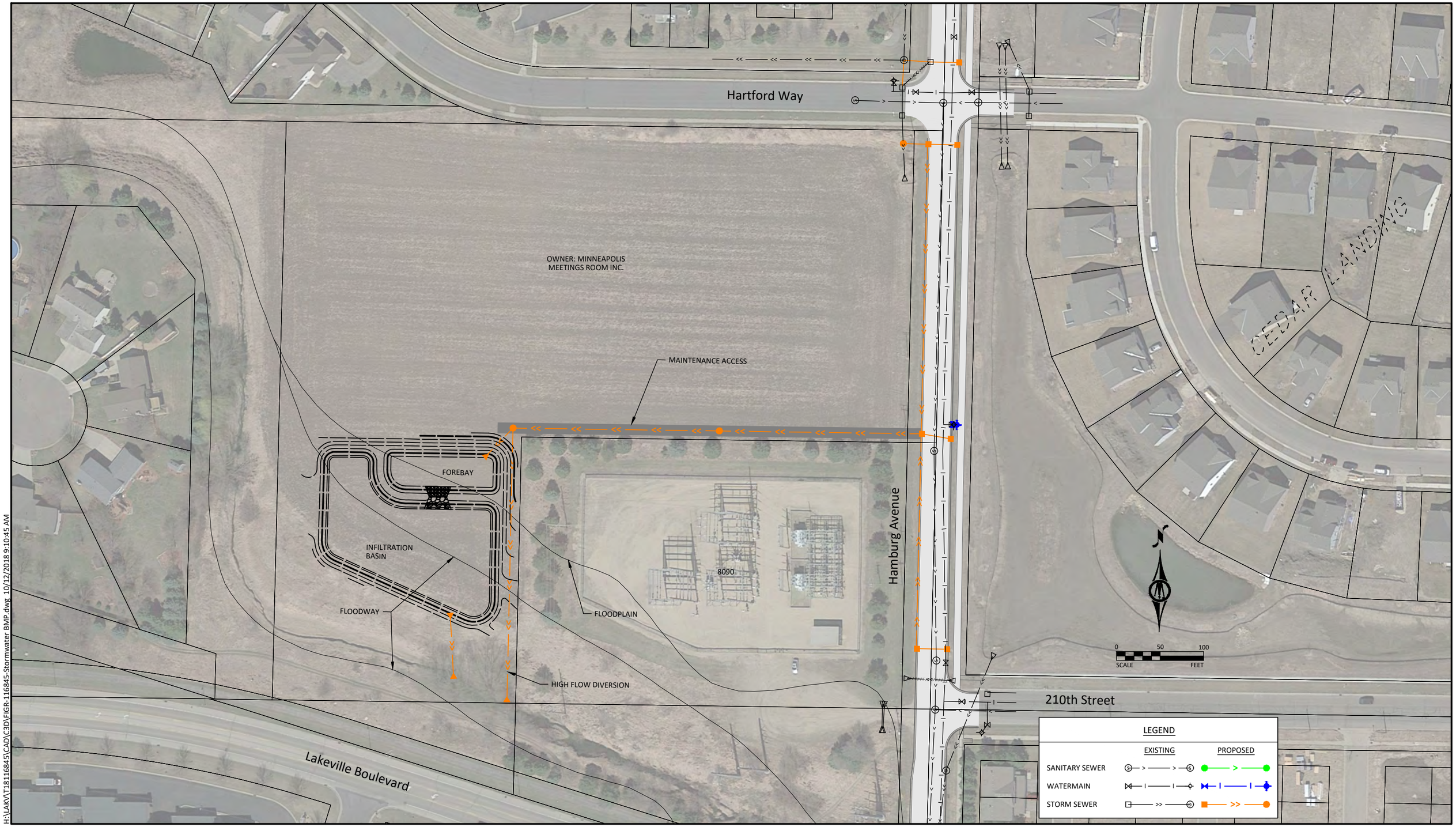

H:\LAK\VT18116845\CAD\C3D\FIGR-116845-Stormwater BMP.dwg 10/12/2018 9:10:45 AM

Hamburg Avenue
City of Lakeville

Figure 6 - Assessable Parcels
September 2018

BOLTON & MENK

#1
#2
#3
#4
#5
#6
#7
#8
#9
#10
#11
#12
#13
#14
#15
#16
#17

Hartford Way
Hartford Way
202nd Street (CSAH 50)
Hamburg Avenue
Hamburg Avenue
Lakeville Blvd
210th Street
205th Street
ASPEEN GROVE

ASSESSABLE PARCELS

AREA 1/2A
AREA 3

0 200 400
HORZ. SCALE FEET

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Appendix B: Preliminary Cost Estimates

CITY OF LAKEVILLE

HAMBURG AVENUE IMPROVEMENTS

PRELIMINARY ENGINEER'S ESTIMATE

LAKEVILLE BLVD TO 202ND STREET
CITY PROJECT NO.: 19-05
BMI PROJECT NO. T18.116845
10/12/2018

NO.	MAT. NO.	ITEM	UNIT	ESTIMATED UNIT PRICE	ESTIMATED QUANTITY	ESTIMATED TOTAL PRICE
PART A - STREET						
1	2021.501	MOBILIZATION	LUMP SUM	$ 99,000.00	1	$ 99,000.00
2	2104.502	REMOVE SIGN TYPE C	EACH	$ 40.00	13	$ 520.00
3	2104.502	SALVAGE HYDRANT & VALVE	EACH	$ 700.00	1	$ 700.00
4	2104.502	SALVAGE MAIL BOX	EACH	$ 50.00	10	$ 500.00
5	2104.503	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	$ 2.50	580	$ 1,450.00
6	2104.504	REMOVE BITUMINOUS PAVEMENT	SQ YD	$ 3.00	4,090	$ 12,270.00
7	2106.507	COMMON EMBANKMENT (CV)	CU YD	$ 5.00	11,680	$ 58,400.00
8	2106.507	EXCAVATION - COMMON (EV) (P)	CU YD	$ 13.00	8,870	$ 115,310.00
9	2106.507	EXCAVATION - SUBGRADE (EV)	CU YD	$ 17.00	4,900	$ 83,300.00
10	2106.507	SELECT GRANULAR EMBANKMENT (CV)	CU YD	$ 17.00	6,600	$ 112,200.00
11	2123.610	STREET SWEEPER (WITH PICKUP BROOM)	HOUR	$ 150.00	60	$ 9,000.00
12	2211.509	AGGREGATE BASE CLASS 5 - STREET	TON	$ 16.00	2,120	$ 33,920.00
13	2215.504	FULL DEPTH RECLAMATION	SQ YD	$ 1.25	8,920	$ 11,150.00
14	2215.607	SALVAGE AND PLACE RECLAIMED MATERIAL	CU YD	$ 11.00	760	$ 8,360.00
15	2357.506	BITUMINOUS MATERIAL FOR TACK COAT	GAL	$ 1.25	1,320	$ 1,650.00
16	2360.509	TYPE SP 12.5 NON-WEARING COURSE MIXTURE (3,C)	TON	$ 60.00	2,170	$ 130,200.00
17	2360.509	TYPE SP 12.5 WEARING COURSE MIXTURE (3,C)	TON	$ 65.00	2,170	$ 141,050.00
18	2504.602	ADJUST VALVE BOX	EACH	$ 450.00	18	$ 8,100.00
19	2504.602	INSTALL SALVAGED HYDRANT & VALVE	EACH	$ 1,000.00	1	$ 1,000.00
20	2506.602	ADJUST SANITARY MANHOLE CASTING WITH INFI-SHIELD	EACH	$ 650.00	17	$ 11,050.00
21	2506.602	ADJUST STORM CATCH BASIN CASTING	EACH	$ 200.00	31	$ 6,200.00
22	2506.602	ADJUST STORM MANHOLE CASTING	EACH	$ 600.00	6	$ 3,600.00
23	2506.603	RECONSTRUCT SANITARY SEWER STRUCTURE	LIN FT	$ 475.00	20	$ 9,500.00
24	2540.602	INSTALL SALVAGED MAIL BOX	EACH	$ 50.00	10	$ 500.00
25	2563.601	TRAFFIC CONTROL	LUMP SUM	$ 15,000.00	1	$ 15,000.00
26	2564.518	SIGN PANELS TYPE C	SQ FT	$ 40.00	280	$ 11,200.00
27	2571.524	TRANSPLANT TREE (SPADE SIZE 78")	TREE	$ 700.00	8	$ 5,600.00
28	2573.501	EROSION CONTROL SUPERVISOR	LUMP SUM	$ 5,000.00	1	$ 5,000.00
29	2573.501	STABILIZED CONSTRUCTION EXIT	LUMP SUM	$ 3,250.00	1	$ 3,250.00
30	2573.502	STORM DRAIN INLET PROTECTION	EACH	$ 200.00	54	$ 10,800.00
31	2573.503	SEDIMENT CONTROL LOG TYPE STRAW	LIN FT	$ 2.00	500	$ 1,000.00
32	2573.503	SILT FENCE, TYPE MS	LIN FT	$ 2.00	4,700	$ 9,400.00

CITY OF LAKEVILLE

HAMBURG AVENUE IMPROVEMENTS

PRELIMINARY ENGINEER'S ESTIMATE

LAKEVILLE BLVD TO 202ND STREET
CITY PROJECT NO.: 19-05
BMI PROJECT NO. T18.116845
10/12/2018

NO.	MAT. NO.	ITEM	UNIT	ESTIMATED UNIT PRICE	ESTIMATED QUANTITY	ESTIMATED TOTAL PRICE
33	2573.601	TEMPORARY EROSION CONTROL	LUMP SUM	$ 3,000.00	1	$ 3,000.00
34	2574.507	COMPOST GRADE 2 (LV)	CU YD	$ 22.00	1,960	$ 43,120.00
35	2574.507	SANDY CLAY LOAM TOPSOIL BORROW (LV)	CU YD	$ 26.50	1,960	$ 51,940.00
36	2574.508	FERTILIZER TYPE 3	POUND	$ 0.75	980	$ 735.00
37	2575.501	TURF ESTABLISHMENT	LUMP SUM	$ 11,000.00	1	$ 11,000.00
38	2575.505	SEEDING	ACRE	$ 200.00	3.3	$ 660.00
39	2575.508	HYDRAULIC MULCH MATRIX	POUND	$ 0.75	11,550	$ 8,662.50
40	2575.508	SEED MIXTURE 25-151	POUND	$ 3.75	600	$ 2,250.00
41	2582.503	24" SOLID LINE MULTI COMP	LIN FT	$ 8.50	25	$ 212.50
42	2582.503	4" DOUBLE SOLID LINE MULTI COMP	LIN FT	$ 0.75	3,600	$ 2,700.00
43	2582.503	4" SOLID LINE MULTI COMP	LIN FT	$ 0.50	7,250	$ 3,625.00
44	2582.518	CROSSWALK MULTI COMP	SQ FT	$ 10.50	400	$ 4,200.00
45	2582.518	PAVEMENT MESSAGE MULTI COMP	SQ FT	$ 12.50	82.32	$ 1,029.00
CONSTRUCTION COSTS: PART A - STREET						**$ 1,053,314.00**
5% CONTINGENCY						**$ 52,665.70**
TOTAL CONSTRUCTION						**$ 1,105,979.70**
28% INDIRECT						**$ 309,674.32**
PROJECT COSTS: PART A - STREET						**$ 1,415,654.02**

CITY OF LAKEVILLE

HAMBURG AVENUE IMPROVEMENTS

PRELIMINARY ENGINEER'S ESTIMATE

LAKEVILLE BLVD TO 202ND STREET
CITY PROJECT NO.: 19-05
BMI PROJECT NO. T18.116845
10/12/2018

NO.	MAT. NO.	ITEM	UNIT	ESTIMATED UNIT PRICE	ESTIMATED QUANTITY	ESTIMATED TOTAL PRICE
PART B - CURB AND GUTTER						
46	2104.503	REMOVE CONCRETE CURB	LIN FT	$ 6.50	300	$ 1,950.00
47	2531.503	CONCRETE CURB AND GUTTER DESIGN B618	LIN FT	$ 12.75	6,600	$ 84,150.00
CONSTRUCTION COSTS: PART B - CURB AND GUTTER						**$ 86,100.00**
5% CONTINGENCY						**$ 4,305.00**
TOTAL CONSTRUCTION						**$ 90,405.00**
28% INDIRECT						**$ 25,313.40**
PROJECT COSTS: PART B - CURB AND GUTTER						**$ 115,718.40**
PART C - TRAIL						
48	2104.503	SAWING CONCRETE PAVEMENT (FULL DEPTH)	LIN FT	$ 4.75	30	$ 142.50
49	2104.518	REMOVE CONCRETE SIDEWALK	SQ FT	$ 2.00	450	$ 900.00
50	2211.509	AGGREGATE BASE CLASS 5 - TRAIL OR SIDEWALK	TON	$ 20.00	1,500	$ 30,000.00
51	2360.509	TYPE 9.5 WEARING COURSE MIXTURE (2,B)	TON	$ 75.00	660	$ 49,500.00
52	2521.518	5" CONCRETE WALK	SQ FT	$ 7.75	1,500	$ 11,625.00
53	2531.618	CONCRETE PEDESTRIAN CURB RAMP	SQ FT	$ 10.00	1,400	$ 14,000.00
54	2531.618	TRUNCATED DOMES	SQ FT	$ 53.00	224	$ 11,872.00
CONSTRUCTION COSTS: PART C - TRAIL						**$ 118,039.50**
5% CONTINGENCY						**$ 5,901.98**
TOTAL CONSTRUCTION						**$ 123,941.48**
28% INDIRECT						**$ 34,703.61**
PROJECT COSTS: PART C - TRAIL						**$ 158,645.09**

CITY OF LAKEVILLE

HAMBURG AVENUE IMPROVEMENTS

PRELIMINARY ENGINEER'S ESTIMATE

LAKEVILLE BLVD TO 202ND STREET
CITY PROJECT NO.: 19-05
BMI PROJECT NO. T18.116845
10/12/2018

NO.	MAT. NO.	ITEM	UNIT	ESTIMATED UNIT PRICE	ESTIMATED QUANTITY	ESTIMATED TOTAL PRICE
PART D - STORM SEWER						
55	2104.502	REMOVE MANHOLE OR CATCH BASIN	EACH	$ 500.00	4	$ 2,000.00
56	2104.502	REMOVE PIPE APRON	EACH	$ 300.00	27	$ 8,100.00
57	2104.503	REMOVE PIPE SEWERS	LIN FT	$ 15.00	830	$ 12,450.00
58	2501.502	15" RC PIPE APRON	EACH	$ 1,350.00	8	$ 10,800.00
59	2503.503	12" RC PIPE SEWER CLASS V	LIN FT	$ 45.00	493	$ 22,185.00
60	2503.503	15" RC PIPE SEWER CLASS V	LIN FT	$ 47.00	1,739	$ 81,733.00
61	2503.503	18" RC PIPE SEWER CLASS V	LIN FT	$ 49.00	712	$ 34,888.00
62	2503.602	CONNECT TO EXISTING PIPE - STORM SEWER	EACH	$ 1,500.00	6	$ 9,000.00
63	2503.602	CONNECT TO EXISTING STRUCTURE - STORM SEWER	EACH	$ 2,000.00	6	$ 12,000.00
64	2506.602	CONSTRUCT 2' X 3' DRAINAGE STRUCTURE DESIGN PER DETAIL LV-STM-1 INCLUDING RINGS AND R-3067-V CASTINGS	EACH	$ 2,200.00	11	$ 24,200.00
65	2506.602	CONSTRUCT 4' DIA DRAINAGE STRUCTURE DESIGN PER DETAIL LV-STM-2 INCLUDING RINGS AND R-1642 CASTINGS	EACH	$ 3,400.00	3	$ 10,200.00
66	2506.602	CONSTRUCT 4' DIA DRAINAGE STRUCTURE DESIGN PER DETAIL LV-STM-2 INCLUDING RINGS AND R-4342 CASTINGS	EACH	$ 3,200.00	3	$ 9,600.00
67	2506.602	CONSTRUCT 4' DIA DRAINAGE STRUCTURE DESIGN SPECIAL MNDOT 4022 TOPSLAB INCLUDING RINGS AND R-3067-V CASTING	EACH	$ 3,400.00	17	$ 57,800.00
CONSTRUCTION COSTS: PART D - STORM SEWER						**$ 294,956.00**
5% CONTINGENCY						**$ 14,747.80**
TOTAL CONSTRUCTION						**$ 309,703.80**
28% INDIRECT						**$ 86,717.06**
PROJECT COSTS: PART D - STORM SEWER						**$ 396,420.86**

CITY OF LAKEVILLE

HAMBURG AVENUE IMPROVEMENTS

PRELIMINARY ENGINEER'S ESTIMATE

LAKEVILLE BLVD TO 202ND STREET
CITY PROJECT NO.: 19-05
BMI PROJECT NO. T18.116845
10/12/2018

NO.	MAT. NO.	ITEM	UNIT	ESTIMATED UNIT PRICE	ESTIMATED QUANTITY	ESTIMATED TOTAL PRICE
PART E - SANITARY SEWER AND WATER MAIN						
68	2104.502	REMOVE MANHOLE	EACH	$ 500.00	1	$ 500.00
69	2104.503	REMOVE PIPE SEWERS	LIN FT	$ 10.00	52	$ 520.00
70	2502.604	4" INSULATION	SQ YD	$ 50.00	48	$ 2,400.00
71	2503.603	6" PVC SANITARY SEWER, SDR 26	LIN FT	$ 45.00	75	$ 3,375.00
72	2503.608	DUCTILE IRON FITTINGS	POUND	$ 10.00	870	$ 8,700.00
73	2504.602	1" CORPORATION STOP	EACH	$ 300.00	17	$ 5,100.00
74	2504.602	1" CURB STOP & BOX	EACH	$ 400.00	17	$ 6,800.00
75	2504.602	12" GATE VALVE & BOX	EACH	$ 3,100.00	2	$ 6,200.00
76	2504.602	6" GATE VALVE & BOX	EACH	$ 1,500.00	4	$ 6,000.00
77	2504.602	8" GATE VALVE & BOX	EACH	$ 2,000.00	1	$ 2,000.00
78	2504.602	CONNECT TO EXISTING WATERMAIN	EACH	$ 1,250.00	2	$ 2,500.00
79	2504.602	HYDRANT	EACH	$ 5,000.00	4	$ 20,000.00
80	2504.603	1" TYPE K COPPER PIPE	LIN FT	$ 25.00	750	$ 18,750.00
81	2504.603	12" PVC C900 WATER MAIN	LIN FT	$ 55.00	1,250	$ 68,750.00
82	2504.603	6" DIP CL 52 WATER MAIN	LIN FT	$ 40.00	55	$ 2,200.00
83	2504.603	8" PVC C900 WATER MAIN	LIN FT	$ 40.00	70	$ 2,800.00
84	2506.602	CONSTRUCT 4' DIA SANITARY SEWER STRUCTURE DESIGN SPECIAL MNDOT 4018 CONE INCLUDING RINGS AND R-1642 CASTING	EACH	$ 3,750.00	1	$ 3,750.00
CONSTRUCTION COSTS: PART E - SANITARY SEWER AND WATER MAIN						**$ 160,345.00**
5% CONTINGENCY						**$ 8,017.25**
TOTAL CONSTRUCTION						**$ 168,362.25**
28% INDIRECT						**$ 47,141.43**
PROJECT COSTS: PART E - SANITARY SEWER AND WATER MAIN						**$ 215,503.68**

CITY OF LAKEVILLE

HAMBURG AVENUE IMPROVEMENTS

PRELIMINARY ENGINEER'S ESTIMATE

LAKEVILLE BLVD TO 202ND STREET
CITY PROJECT NO.: 19-05
BMI PROJECT NO. T18.116845
10/12/2018

NO.	MAT. NO.	ITEM	UNIT	ESTIMATED UNIT PRICE	ESTIMATED QUANTITY	ESTIMATED TOTAL PRICE
PART F - STORMWATER BMP						
85	2101.501	CLEARING AND GRUBBING	LUMP SUM	$ 2,500.00	1	$ 2,500.00
86	2105.507	COMMON EXCAVATION - POND (EV) (P)	CU YD	$ 16.00	7,400	$ 118,400.00
87	2211.509	AGGREGATE BASE CLASS 5 - STREET	TON	$ 16.00	260	$ 4,160.00
88	2451.507	COARSE AGGREGATE BEDDING (LV)	CU YD	$ 55.00	60	$ 3,300.00
89	2501.502	15" RC PIPE APRON	EACH	$ 1,350.00	2	$ 2,700.00
90	2501.502	18" RC PIPE APRON	EACH	$ 1,500.00	1	$ 1,500.00
91	2501.502	24" RC PIPE APRON	EACH	$ 2,150.00	1	$ 2,150.00
92	2503.503	15" RC PIPE SEWER CLASS V	LIN FT	$ 47.00	75	$ 3,525.00
93	2503.503	18" RC PIPE SEWER CLASS V	LIN FT	$ 49.00	315	$ 15,435.00
94	2503.503	24" RC PIPE SEWER CLASS III	LIN FT	$ 55.00	515	$ 28,325.00
95	2506.602	CONSTRUCT 4' DIA DRAINAGE STRUCTURE DESIGN PER DETAIL LV-STM-2 INCLUDING RINGS AND R-1642 CASTINGS	EACH	$ 3,400.00	1	$ 3,400.00
96	2506.602	CONSTRUCT 8' DIA DRAINAGE STRUCTURE DESIGN PER DETAIL LV-STM-2 INCLUDING RINGS AND R-1642 CASTINGS	EACH	$ 7,500.00	1	$ 7,500.00
97	2511.507	RANDOM RIPRAP CLASS III	CU YD	$ 95.00	60	$ 5,700.00
98	2511.507	RANDOM RIPRAP CLASS IV	CU YD	$ 105.00	50	$ 5,250.00
99	2573.503	SEDIMENT CONTROL LOG TYPE STRAW	LIN FT	$ 2.00	100	$ 200.00
100	2573.503	SILT FENCE, TYPE MS	LIN FT	$ 2.00	700	$ 1,400.00
101	2573.601	TEMPORARY EROSION CONTROL	LUMP SUM	$ 1,000.00	1	$ 1,000.00
102	2574.507	COMPOST GRADE 2 (LV)	CU YD	$ 22.00	420	$ 9,240.00
103	2574.507	SANDY CLAY LOAM TOPSOIL BORROW (LV)	CU YD	$ 26.50	420	$ 11,130.00
104	2574.508	FERTILIZER TYPE 3	POUND	$ 0.75	210	$ 157.50
105	2574.607	FINE FILTER EMBANKMENT MODIFIED - INFILTRATION BASIN (CV)	CU YD	$ 50.00	2,530	$ 126,500.00
106	2575.501	TURF ESTABLISHMENT	LUMP SUM	$ 2,000.00	1	$ 2,000.00
107	2575.505	SEEDING	ACRE	$ 200.00	0.70	$ 140.00
108	2575.508	HYDRAULIC MULCH MATRIX	POUND	$ 0.75	2,450	$ 1,837.50
109	2575.508	SEED MIXTURE 35-241	POUND	$ 16.00	60	$ 960.00
CONSTRUCTION COSTS: PART F - STORMWATER BMP						**$ 358,410.00**
5% CONTINGENCY						**$ 17,920.50**
TOTAL CONSTRUCTION						**$ 376,330.50**
28% INDIRECT						**$ 105,372.54**
PROJECT COSTS: PART F - STORMWATER BMP						**$ 481,703.04**

CITY OF LAKEVILLE

HAMBURG AVENUE IMPROVEMENTS

PRELIMINARY ENGINEER'S ESTIMATE

LAKEVILLE BLVD TO 202ND STREET

CITY PROJECT NO.: 19-05

BMI PROJECT NO. T18.116845

10/12/2018

SUMMARY		
CONSTRUCTION COSTS: PART A - STREET	$	1,053,314
5% CONTINGENCY	$	52,666
TOTAL CONSTRUCTION	$	1,105,980
28% INDIRECT	$	309,674
PROJECT COSTS: PART A - STREET	**$**	**1,415,654**
CONSTRUCTION COSTS: PART B - CURB AND GUTTER	$	86,100
5% CONTINGENCY	$	4,305
TOTAL CONSTRUCTION	$	90,405
28% INDIRECT	$	25,313
PROJECT COSTS: PART B - CURB AND GUTTER	**$**	**115,718**
CONSTRUCTION COSTS: PART C - TRAIL	$	118,040
5% CONTINGENCY	$	5,902
TOTAL CONSTRUCTION	$	123,941
28% INDIRECT	$	34,704
PROJECT COSTS: PART C - TRAIL	**$**	**158,645**
CONSTRUCTION COSTS: PART D - STORM SEWER	$	294,956
5% CONTINGENCY	$	14,748
TOTAL CONSTRUCTION	$	309,704
28% INDIRECT	$	86,717
PROJECT COSTS: PART D - STORM SEWER	**$**	**396,421**
CONSTRUCTION COSTS: PART E - SANITARY SEWER AND WATER MAIN	$	160,345
5% CONTINGENCY	$	8,017
TOTAL CONSTRUCTION	$	168,362
28% INDIRECT	$	47,141
PROJECT COSTS: PART E - SANITARY SEWER AND WATER MAIN	**$**	**215,504**
CONSTRUCTION COSTS: PART F - STORMWATER BMP	$	358,410
5% CONTINGENCY	$	17,921
TOTAL CONSTRUCTION	$	376,331
28% INDIRECT	$	105,373
PROJECT COSTS: PART F - STORMWATER BMP	**$**	**481,703**
SUBTOTAL CONSTRUCTION COSTS	**$**	**2,071,165**
5% CONTINGENCY	**$**	**103,558**
TOTAL CONSTRUCTION	**$**	**2,174,723**
28% INDIRECT	**$**	**608,922**
TOTAL PROJECT COSTS	**$**	**2,783,645**

Appendix C: Special Assessment Policy

SPECIAL ASSESSMENT POLICY RELATING TO THE REHABILITATION OF ROADWAYS

Policy 5.14

1) PURPOSE

a) The City of Lakeville, Minnesota finds that it is in the best interest of the City to outline the policy and procedures for calculating the special assessments to benefitting properties using the 429 Special Assessment Process.

b) The policy shall apply to the rehabilitation of roadways with existing paved surfaces.

2) OBJECTIVE

a) The City currently utilizes the 429 Special Assessment Process to fund a portion of the costs associated with the rehabilitation of roadways within the City. This policy is intended to:

i) Define the share of improvement costs to be specially assessed to benefitting properties

ii) Identify the method(s) for calculating the assessments

iii) Identify the improvement types for which special assessments will be levied

iv) Identify the assessment period for the specified improvement type

3) GENERAL

a) Minnesota Statutes Chapter 429 gives cities the authority to levy special assessments for public improvement projects to the benefitting property owners.

4) IMPROVEMENT COSTS TO BE SPECIALLY ASSESSED TO BENEFITTED PROPERTIES.

a) It is the policy of the City to special assesses benefiting property for street reconstruction including mill and overlay costs in neighborhoods where the majority of the streets have deteriorated to the extent whereby it is no longer cost effective to provide routine maintenance.

b) The special assessments will not be in excess of the benefit to the property. This policy applies to all streets that are public streets.

c) Benefited properties shall be assessed 40% of the project costs, as calculated using the contract bid prices for the project.

d) For the purposes of street reconstruction or mill and overlay, the project costs will include the cost of replacing or repairing concrete curb and gutter. In those cases where bituminous curbing is replaced with concrete curb and gutter, or where curb and gutter did not previously exist, the additional benefit will be assessed. The cost to be assessed shall be 100% of the cost of installing the concrete curb and gutter. This cost will be assessed on either a front foot or per lot basis. In areas where no storm sewer currently exists, the addition of a storm sewer system will also be considered an additional benefit and shall be assessed at 100% of the cost.

e) Project cost includes both direct construction costs and all indirect costs such as engineering, financing and administration.

f) Assessments for properties guided or zoned for single-family use shall be made on a per parcel (unit) basis. A property may be assessed for more than one unit in cases where the property could be reasonably further subdivided in accordance with current zoning and subdivision requirement.

g) The City recognizes that various housing types typically do not carry the same number of persons (due to their respective densities) or generate the same amount of wear on the streets. Therefore, the following table outlines the cost allocation to be assessed per project:

Land use	**Factor**
Single family and detached townhomes	1.00
Duplexes	0.50
Town homes	0.50
Apartments	0.25

h) Along major collector and arterial roadways, the Single Family Unit Rate shall be prorated to reflect the City's typical 40-foot minor collector street section.

i) If a street is reconstructed to a design standard greater than the current design standard due to the actual or zoned uses, the additional cost to reconstruct the street shall be fully assessed to those properties. If the street is reconstructed to a design different than the current standard, the total cost shall be fully assessed to those properties if conditions warrant.

j) Properties abutting county roadways reconstructed to complete urban design and having reasonable access thereto shall be assessed in accordance with this policy. The assessments shall be used to defray the City's cost participation in the county improvement projects.

k) Properties or areas of property that have been determined to be unbuildable shall be excluded from assessments. No building permits will be issued for such property so deleted from assessments.

l) Senior Citizens and Disabled People Special Assessments Deferrals are available in accordance with City policy. Other deferrals may be available as authorized by State Statute, Section 429.

m) City will **not** special assess the cost of routine maintenance such as sealcoating, crack sealing or minor patching.

n) Commercial and Industrial
   (1) The method for calculating the special assessments for commercial and industrial properties shall be on a front foot basis, unless it is otherwise determined by the City Council.
   (2) The front foot unit assessment rate will be based on the average cost per foot of assessable roadway improvements
   (3) At the City Council's discretion, assessments may also be calculated using the same methodology as the predominant surrounding land use and/or zoning of the area.
      a. For properties used or zoned for other than residential use, the Assessable Units will be calculated by multiplying the number of front feet by 1.5 (because streets and roadways adjacent to non-residential uses are typically constructed to higher standards) and divided by the minimum required lot width based on the lot requirements for the predominant single-family zoning in the area.

o) Institutional and Public Properties
   (1) The method for calculating the special assessments for these properties shall be the same methodology as the predominant surrounding land use and/or zoning of the area, unless it is otherwise determined by the City Council.
   (2) At the City Council's discretion, assessments may also be calculated on a front foot basis.

p) Mixed Use Areas
   (1) The method for calculating the special assessments in these areas shall be the same methodology as the predominant surrounding land use and/or zoning of the area, unless it is otherwise determined by the City Council.
      a. For properties used or zoned for commercial or industrial use, the Assessable Units will be calculated by multiplying the number of front feet by 1.5 (because streets and roadways adjacent to non-residential uses are typically constructed to higher standards) and divided by the minimum required lot width based on the lot requirements for the predominant single-family zoning in the area.
   (2) At the City Council's discretion, assessments may also be calculated on a front foot basis.

q) Agricultural land. Agricultural properties, regardless of the number of individual tax parcels, shall be assessed residential units commensurate with the number of users for the agricultural land (i.e. If there is one residential building structure for multiple adjacent agricultural tax parcels under the same ownership, only one residential unit assessment shall be levied, and it shall be levied against the parcel containing the building structure

5) <u>SPECIAL ASSESSMENT TERMS</u>

a) As established by the City Council, but typically:
(1) Reconstruction = 10 to 20-years
(2) Mill and Overlay = 10-years

Appendix D: Geotechnical Investigation

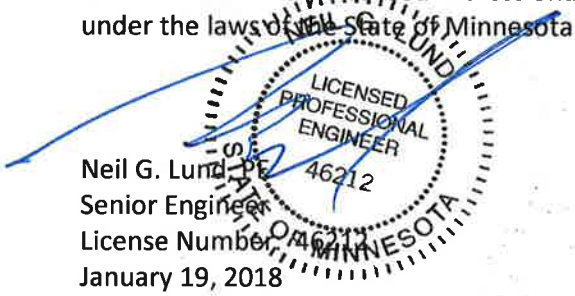
Geotechnical Evaluation Report

Hamburg Avenue Reconstruction
Lakeville Boulevard to 202nd Street
Lakeville, Minnesota
City Project 19-05

Prepared for

City of Lakeville

Professional Certification:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



Neil G. Lund, PE
Senior Engineer
License Number 46212
January 19, 2018

Project B1710632

Braun Intertec Corporation

BRAUN INTERTEC
The Science You Build On.

BRAUN INTERTEC
The Science You Build On.

Braun Intertec Corporation
11001 Hampshire Avenue S
Minneapolis, MN 55438

Phone: 952.995.2000
Fax: 952.995.2020
Web: braunintertec.com

January 19, 2018

Project B1710632

Mr. Joseph Powers
City of Lakeville
20195 Holyoke Avenue
Lakeville, MN 55044

Re: Geotechnical Evaluation
Hamburg Avenue Reconstruction
Lakeville Boulevard to 202nd Street
Lakeville, Minnesota
City Project 19-05

Dear Mr. Powers:

We are pleased to present this Geotechnical Evaluation Report for the Hamburg Avenue Reconstruction project in Lakeville, Minnesota. Our results and recommendations in light of the geotechnical issues influencing design and construction are presented in the attached report, which we request that you read in its entirety.

Remarks

Thank you for making Braun Intertec Corporation your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please call Neil Lund at 952.995.2284.

Sincerely,

BRAUN INTERTEC CORPORATION

Neil G. Lund, PE
Senior Engineer

Matthew S. Oman, PE
Principal Engineer

AA/EOE

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Appendix

A. Introduction

A.1. Project Description

This Geotechnical Evaluation Report addresses the proposed Hamburg Avenue Reconstruction project between Lakeville Boulevard and 202nd Street (CSAH 50) in Lakeville, Minnesota. The project will involve approximately 4,200 feet of street reconstruction that will include the following:

- 202nd Street to Hartford Way: Installation of curb and gutter, roadway widening, full-depth reconstruction and installation of storm sewer and 12 inch PVC watermain.

- Hartford Way to 210th Street: Installation of curb and gutter and widening on east side, pavement reclamation and installation of storm sewer.

- 210th Street to Lakeville Boulevard: Installation of curb and gutter, widening, either full-depth reconstruction or reclamation, and installation of storm sewer.

We anticipate grade changes will be about 3 or 4 feet where widening will encroach on existing ditches. We assume the surface grades will otherwise be similar to those of the existing roadway.

Design utility depths were not provided. We assume utilities will generally be less than 10 feet below grade.

A.2. Project Area Conditions

Hamburg Avenue is a two-lane, two-way roadway with a rural cross-section and flat-to-rolling topography. The adjacent zoning is low-density residential.

According to Minnesota Department of Transportation (MnDOT) data, traffic as of 2015 was 1,650 vehicles per day. Using this value in the MnDOT State Aid 10 Ton ESAL Traffic Forecast Calculator, we estimate this will result in 166,000 equivalent single-axle loads (ESALs) over a 20-year design period. Our estimate uses a traffic projection factor of 1.02 (provided by the City of Lakeville) and an “urban” traffic distribution. We should be contacted to update our ESAL estimate and pavement design if future studies project for greater traffic volumes or other vehicle distributions.

Grades along the corridor range from about 956 to 1031 feet above mean sea level (MSL) according to our boring data.

According to the City of Lakeville, the segment from Hartford Way to 210th Street was constructed in 2002 with 3 1/2 to 4 inches of bituminous pavement over 6 inches of aggregate base. A similar section (4 inches bituminous, 6 inches aggregate base) was reportedly placed in 2000/2001 between 210th Street and Lakeville Boulevard.

A.3. Purpose

The purpose of our geotechnical evaluation was to characterize subsurface geologic conditions at selected exploration locations and provide recommendations for the Hamburg Avenue reconstruction.

A.4. Background Information and Reference Documents

To facilitate our evaluation, we were provided with or reviewed the following information or documents:

- A base map of the project area provided by the City of Lakeville.
- *Geologic Atlas of Dakota County* available from the Minnesota Geological Survey.
- MnDOT traffic and segment data.

In addition to the provided sources, we have used several publicly available sources of information including aerial photography from Google Earth.

We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses and/or recommendations.

A.5. Scope of Services

Our scope of services for this project was originally submitted as a Proposal (QTB066105) to Mr. Alex Jordan of the City of Lakeville, for which we received authorization to proceed on October 17, 2017. Tasks performed in accordance with our authorized scope of services included:

- Staking and clearing the exploration location of underground utilities. The City of Lakeville selected and we staked the new exploration locations. We acquired the surface elevations and locations with GPS technology using the State of Minnesota's permanent GPS base station network. The Soil Boring Location Sketch included in the Appendix shows the approximate locations of the borings and ground elevations are shown on the boring logs.

- Performing five (5) penetration test borings to 10 feet below the existing surfaces.

- Providing for subcontracted traffic control during our field operations.

- Performing laboratory moisture content tests and mechanical analyses (#200 sieve only) on selected penetration test samples.

- Preparing this report containing a CAD sketch, exploration logs, a summary of the geologic materials encountered, results of laboratory tests, and recommendations for subgrade preparation, pavement reclamation, pavement thickness design and utility placement.

Our scope of services did not include environmental services or testing, and we did not train the personnel performing this evaluation to provide environmental services or testing. We can provide these services or testing at your request.

B. Results

B.1. Geologic Overview

According to available references, Hamburg Avenue overlies Des Moines lobe glacial till in the northern portion and glacial outwash to the south.

We based the geologic origins used in this report on the soil types, laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain. We did not perform a detailed investigation of the geologic history for the site.

B.2. Boring Results

B.2.a. Geologic Materials

Table 1 provides a summary of the soil boring results in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheets in the Appendix include definitions of abbreviations used in Table 1.

Table 1. Hamburg Avenue Pavement Thickness and Subgrade Soil Type Summary

Boring	Pavement Thicknesses (inches)		Topsoil Thickness (feet)	Subsurface Soil Classification(s)	Notes
	Bituminous	Aggregate Base			
ST-1	4	3 1/2	---	CL, SC	0.6 to 4 feet noted as "buried topsoil" (slightly organic CL)
ST-2	---	---	0.4	SC, CL	---
ST-3	---	---	---	SM, SC, SP	Top 2 feet identified as nonorganic fill
ST-4	4	6	---	SC, SP-SM	---
ST-5	---	---	5	CL	Two layers of topsoil identified: a surficial layer in the upper root zone (0 to 0.4 feet) and underlying organic clay (0.4 to 5 feet).

The "aggregate base" was identified by the drillers in the field. Note the term "aggregate base" does not imply conformance of the materials to a particular gradation or specification.

The soils encountered beneath pavement layers or topsoil varied and included lean clay with sand, sandy lean clay, clayey sand, silty sand and poorly graded sand with silt. Blow counts in native cohesive soils (glacial till) were between 4 and 9 blows per foot (BPF), suggesting rather soft to rather stiff consistencies. Native cohesionless soils (glacial outwash) had blow counts between 14 and 20, which is medium dense relative density.

B.2.b. Groundwater

Groundwater was not observed as our borings were advanced. Based on the moisture contents of the samples obtained by drilling, it does not appear groundwater was present within the depths explored at the time of our testing.

Seasonal and annual fluctuations of groundwater should also be anticipated.

B.3. Laboratory Test Results

The glacial till and clayey fill soils had moisture contents between 14 and 15 percent, indicating they were likely near or slightly above their optimum moisture contents (OMC) for compaction. The moisture content of the organic topsoil layer in ST-5 was 28 percent.

A single moisture content test in cohesionless soils returned a value of 5 percent, which is near the OMC for such soils.

The organic content of soils identified as topsoil or buried topsoil was between 3 and 5 percent ("slightly organic" according to MnDOT classifications).

C. Recommendations

C.1. Design and Construction Discussion

The City of Lakeville is planning to design and construct Hamburg Avenue in three segments as follows:

- 202nd Street to Hartford Way: full-depth reconstruction. Reconstruction will require removal of organic soils such as those present in ST-5. We provide additional recommendations for subgrade preparation in Section C.2.a.

- Hartford Way to 210th Street: Widening on east side, pavement reclamation. According to the City's typical section, total pavement includes 4 inches of bituminous over 6 inches of aggregate base. This will generally be adequate for reclamation. We discuss this process in Section C.1.b.

- 210th Street to Lakeville Boulevard: Widening, full-depth reconstruction or reclamation. This segment has a similar section to the segment to the north, which is supported by the pavement thicknesses measured at ST-4. Consult Section C.1.b. for further discussion on reclamation, and Section C.2.a. for work related to subgrade preparation in the widening areas.

C.1.a. Pavements and Drainage

It appears pavement subgrades will consist of a wide variety of soils on Hamburg Avenue, including cohesive clayey soils, cohesionless sands and topsoil. The clayey or sandy fill soils present below the topsoil or pavement will generally be suitable for pavement support in their current condition; deep topsoil such as encountered in ST-5, however, will not. The clayey soils may also require additional work, such as drying or moisture conditioning, if wet or allowed to become wet once excavated.

We recommend placing drain tile about catch basins and at low points behind curb in order to facilitate drainage of the pavement system where storm sewer or ditch outlets allow. The drain tile should be trenched at least 8 inches below the aggregate base (or subbase), wrapped in filter fabric and backfilled with highly permeable aggregate.

C.1.b. Pavement Reuse

Full-depth reclamation (FDR) of existing pavement materials is one possible source of aggregate base for the reconstruction projects. The pavements of Hamburg Avenue north of Hartford Way (based on ST-1) appeared to be relatively thin. This can complicate the FDR process and result in a product not suitable for reuse as aggregate base elsewhere on the project. For these reasons, we recommend caution if performing FDR in the northern segment.

Based solely on ST-4, it appears the southern segment has a section similar to that reported by the City of Lakeville (10 inches total). This is a suitable thickness for FDR. In order to accommodate a new pavement section, the FDR material will either need to be windrowed to provide access to the subgrade, or a portion of the reclaim will need to be removed from the top. We recommend a proofroll of the reclaimed material as described in Section C.2.c.

C.1.c. Utilities

The reuse of the utility trench backfill soils will have potential impacts on the pavement subgrades. If the backfill is not properly compacted, there is the potential for subgrade instability and settlement (and premature deterioration) of the pavement surface. We anticipate that most of the trench soils on Hamburg Avenue will consist of clayey glacial till or sandy glacial outwash. Depending on the conditions

at the time of excavation, watering or drying (moisture conditioning) of the soils may be necessary to achieve the levels of compaction recommended.

Clayey trench soils that are exposed to moisture will be more susceptible to strength loss and may also become unstable, which will require moisture conditioning or removal and replacement with suitable soils.

C.2. Subgrade Preparation

C.2.a. Pavement Subgrade Preparation

We recommend the following steps for pavement subgrade preparation:

1. Strip unsuitable soils consisting of topsoil, organic soils, peat, vegetation, and pavements from the roadway and widening area as required. In some locations, such as near ST-5 and in areas with similar soil profiles, this may require significant cuts. Geotextile fabric is an option at the bottom of soil subcuts but is not necessary to provide a stable surface for placement.

2. Have a geotechnical representative observe the excavated subgrade to evaluate if additional subgrade improvements are necessary.

3. Slope subgrade soils to areas of sand or drain tile to allow the removal of accumulating water.

4. Scarify, moisture condition and surface compact the subgrade to meet the compaction requirements for the project.

5. Proofroll the pavement subgrades as described in Section C.2.c.

Preparation of sideslopes in widening areas will require additional considerations, including stair-step benches in slopes steeper than 1:4 (V:H).

C.2.b. Excavated Slopes

Based on the borings, we anticipate on-site soils in excavations will consist of poorly graded sand, poorly graded sand with silt and silty sand soils. These soils are typically considered Type C Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type C soils should have a gradient no steeper than 1:1 1/2 (V:H). Slopes constructed in this manner may still exhibit surface sloughing. OSHA requires an engineer to evaluate slopes or excavations over 20 feet in depth.

An OSHA-approved qualified person should review the soil classification in the field. Excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches." This document states excavation safety is the responsibility of the contractor. The project specifications should reference these OSHA requirements.

C.2.c. Pavement Subgrade Proofroll

After preparing the subgrade as described above and prior to the placement of the aggregate base, we recommend proofrolling the subgrade soils with a fully loaded tandem-axle truck. We also recommend having a geotechnical representative observe the proofroll. Areas that fail the proofroll likely indicate soft or weak areas that will require additional soil correction work to support pavements.

The contractor should correct areas that display excessive yielding or rutting during the proofroll, as determined by the geotechnical representative. Possible options for subgrade correction include moisture conditioning and recompaction, subcutting and replacement with soil or crushed aggregate, chemical stabilization and/or geotextiles. We recommend performing a second proofroll after the aggregate base material is in place, and prior to placing bituminous pavement.

C.2.d. Engineered Fill Materials and Compaction

Table 2 below contains our recommendations for engineered fill materials. In widened areas, we recommend matching the composition of the adjacent subgrade soils to the extent possible. Transitions between subgrade depths, between cohesive and cohesionless soil or other drastic changes in soil type should be sloped longitudinally at a minimum of 1:20 (V:H) and transversely at a minimum of 1:5 (V:H). In no case should cohesive soils be placed over cohesionless soils.

Table 2. Engineered Fill Materials

Locations	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
Pavement and embankment fill Utility support and backfill	MnDOT select grading material	SP, SP-SM, SM, SC, CL	varies	PI < 15 % silt < 80% < 5% OC
Below landscaped surfaces, where subsidence is not a concern	Non-structural fill	varies	100% passing 6-inch sieve	< 10% OC

We recommend spreading engineered fill in loose lifts of approximately 12 inches thick. We recommend compacting engineered fill in accordance with MnDOT Specifications 2105 (or 2106).

Our compaction requirements are summarized in Table 3.

Table 3. Compaction Recommendations Summary

Reference	Relative Compaction, percent (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum, percentage points	
		< 12% Passing #200 Sieve (Typically SP, SP-SM)	> 12% Passing #200 Sieve (Typically CL, SC, ML, SM)
Within 3 feet of pavement subgrade	100	±3	-1 to +3
More than 3 feet below pavement subgrade	95	±3	±3
Below landscaped surfaces	90	±5	±4
Below utilities	95	±3	-1 to +3

The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material. Frost should not penetrate under foundations during construction.

We recommend performing density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

C.3. Pavements

C.3.a. Design Sections

Laboratory tests to determine an R-value for pavement design were not included in the scope of this project. Given the varied subgrade soil types, we recommend using an R-value of 20 for pavement thickness design.

The City of Lakeville standard pavement section for collector routes (4 inches bituminous pavement; 6 inches aggregate base; 24 inches select granular subbase at this R-value) can support approximately 1.5 million 20-year ESALs according to MnPAVE-Flexible design (minimum reliability of 90 percent). See the design output attached this report.

Table 4. Lakeville Standard Collector Section

Layer	Thickness (inches)	MnDOT Specification/Designation
Bituminous Wear	2 (1 lift)	SPWEB340C (2360)
Bituminous Non-wear	2 (1 lift)	SPNWB330C (2360)
Aggregate Base	6	Class 5 (3138)
Subbase	24	(Select Granular modified per City standards (MnDOT Specification 3149.2B4)

The above pavement design is based upon a 20-year performance life at the lifetime traffic loading indicated on the MnPAVE-Flexible output. This is the amount of time before major reconstruction is anticipated. This performance life assumes maintenance such as seal coating and crack sealing is routinely performed. The actual pavement life will vary depending on variations in weather, traffic conditions (which are considerably less than the pavement capacity) and maintenance.

C.3.b. Materials and Compaction

We recommend specifying pavement materials as recommended in Table 4.

We recommend compacting the aggregate base to meet the requirements of MnDOT Specification 2211.3D.2.c (Penetration Index Method). We recommend compacting bituminous pavements per the Maximum Density Method (Specification 2360.6B).

C.4. Utilities

C.4.a. Subgrades

The native soils encountered at likely utility elevations generally appear suitable for pipe and utility structure support and we anticipate that utilities can be installed per manufacturer bedding requirements. We nonetheless recommend providing a contingency for some subcutting and replacement of these materials as part of construction. In the event that unstable or organic soils are encountered at pipe elevations, they should be subcut and replaced with crushed-faced rock that is free of material 1 inch in diameter or smaller. MnDOT stabilizing aggregate (Specification 3149.2C) is a suitable material of this type.

We recommend that a geotechnical engineer observe all utility trench excavations and subcuts.

C.4.b. Excavation Side Slopes

The project area soils appear to meet several soil types by OSHA classification. We therefore recommend constructing excavation side slopes to lie back at a horizontal to vertical slope of 1 1/2 to 1 or flatter.

All excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches." This document states that excavation safety is the responsibility of the contractor. Reference to these OSHA requirements should be included in the project specifications.

C.4.c. Selection, Placement and Compaction of Backfill

We recommend compacting backfill placed above and below utilities as recommended in Table 3.

Where it is necessary to achieve compaction over wet or waterbearing subgrades, we recommend the sands or gravel with less than 5 percent by weight passing the number 200 sieve and less than 50 percent passing the number 40 sieve. MnDOT filter aggregates (3149.2J) are appropriate materials of this type.

C.4.d. Excavation Dewatering

We recommend removing groundwater from the utility excavations if encountered, and removing any water that seeps into excavations from sidewalls or the adjacent sitework. It appears utility construction and trenching will be in areas with both sandy and clayey soils. Sumps and pumps will generally be suitable for short-term water removal under such conditions if the scale of dewatering is small; for large-scale dewatering in sands, alternative approaches may be necessary.

C.4.e. Corrosion Potential

We recommend providing corrosion protection for any ductile iron pipe in the clayey soils throughout the project based on our past experience with soils in the area.

C.5. Construction Quality Control

C.5.a. Excavation Observations

We recommend having a geotechnical engineer observe all excavations related to subgrade preparation, utility placement and pavement construction. The purpose of the observations is to evaluate the competence of the geologic materials exposed in the excavations and the adequacy of required excavation oversizing.

C.5.b. Materials Testing

We recommend density tests be taken in excavation backfill and additional required fill placed below pavements and utilities.

We recommend Gyratory tests on bituminous mixes to evaluate strength and air voids and density tests to evaluate compaction.

C.5.c. Pavement Subgrade Proofroll

We recommend that proofrolling of the pavement subgrades be observed by a geotechnical engineer to determine if the results of the procedure meet project specifications and to delineate the extent of additional pavement subgrade preparation work that may be necessary.

C.5.d. Cold Weather Precautions

If site grading and construction is anticipated during cold weather, all snow and ice should be removed from cut and fill areas prior to additional grading. No fill should be placed on frozen subgrades. No frozen soils should be used as fill.

Concrete delivered to the site should meet the temperature requirements of ASTM C 94. Concrete should not be placed on frozen subgrades. Concrete should be protected from freezing until the necessary strength is attained.

D. Procedures

D.1. Penetration Test Borings

We drilled the penetration test borings with a float tire-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2-foot intervals in general accordance to ASTM D1586.

D.2. Exploration Logs

D.2.a. Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials, and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of laboratory tests performed on penetration test samples and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.2.b. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance and other in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.3. Material Classification and Testing

D.3.a. Visual and Manual Classification

The geologic materials encountered were visually and manually classified in accordance with ASTM Standard Practice D 2488. A chart explaining the classification system is attached. Samples were placed in jars or bags and returned to our facility for review and storage.

D.3.b. Laboratory Testing

The results of the laboratory tests performed on geologic material samples are noted on or follow the appropriate attached exploration logs. The tests were performed in accordance with ASTM or AASHTO procedures.

D.4. Groundwater Measurements

The drillers checked for groundwater as the penetration test borings were advanced, and again after auger withdrawal in both power auger and penetration test borings. The boreholes were then backfilled as noted on the boring logs.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work, or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs, and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

E.2.b. Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

100' 0 200'

SCALE: 1"= 200'

BRAUN INTERTEC
The Science You Build On.
11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Drawing Information

Project No:	B1710632
Drawing No:	B1710632
Drawn By:	JAG
Date Drawn:	10/20/17
Checked By:	NGL
Last Modified:	11/1/17

Project Information

Hamburg Avenue Reconstruction

202nd Street (CSAH 50) TO Lakeville Boulevard

Lakeville, Minnesota

Soil Boring Location Sketch

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1710632
GEOTECHNICAL EVALUATION
Hamburg Avenue Reconstruction
Lakeville Boulevard to 202nd Street (CSAH 50)
Lakeville, Minnesota

BORING: **ST-1**

LOCATION: See attached sketch.

DRILLER: B. Kammermeier | METHOD: 3 1/4" HSA, Autohammer | DATE: **10/27/17** | SCALE: **1" = 4'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
1031.3	0.0						
1030.7	0.6	PAV	4 inches of bituminous over 3 1/2 inches of aggregate base.				
		CL	SANDY LEAN CLAY, slightly organic, trace roots, dark brown, moist. (Buried Topsoil)	14		14	OC=3%
1027.3	4.0	FILL	FILL: Clayey Sand, dark brown and brown, moist to wet.	5			
				5			
1022.3	9.0	CL	SANDY LEAN CLAY, brown, moist, medium. (Glacial Till)	8			
1020.3	11.0		END OF BORING.				
			Water not observed while drilling.				
			Boring then backfilled.				

BRAUN INTERTEC

LOG OF BORING

Braun Project B1710632
GEOTECHNICAL EVALUATION
Hamburg Avenue Reconstruction
Lakeville Boulevard to 202nd Street (CSAH 50)
Lakeville, Minnesota

BORING: **ST-2**

LOCATION: See attached sketch.

DRILLER: B. Kammermeier | METHOD: 3 1/4" HSA, Autohammer | DATE: **10/27/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
976.7	0.0							
976.3	0.4	SP/SC	Mixed Poorly Graded Sand and Lean Clay, trace Gravel, dark brown, wet. (Topsoil)					
			CLAYEY SAND, brown, wet, rather soft to medium. (Glacial Till)	4		15	44	
				6				
969.7	7.0		Gray at 6 feet.					
		CL	LEAN CLAY with SAND, brown, wet, rather soft to medium. (Glacial Till)	4				
				6				
965.7	11.0		END OF BORING.					
			Water not observed while drilling.					
			Boring then backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2017\10632.GPJ BRAUN_V8_CURRENT.GDT 11/27/17 11:00

BRAUN INTERTEC

LOG OF BORING

Braun Project B1710632
GEOTECHNICAL EVALUATION
Hamburg Avenue Reconstruction
Lakeville Boulevard to 202nd Street (CSAH 50)
Lakeville, Minnesota

BORING: **ST-3**

LOCATION: See attached sketch.

DRILLER: B. Kammermeier | METHOD: 3 1/4" HSA, Autohammer | DATE: **10/27/17** | SCALE: **1" = 4'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
957.9	0.0					
		FILL	FILL: Silty Sand, fine- to medium-grained, with Gravel, brown, moist.			
955.9	2.0					
		SC	CLAYEY SAND, brown, wet, rather soft. (Glacial Till)	4		
952.9	5.0					
		SP	POORLY GRADED SAND, fine- to coarse-grained, trace Gravel, wet, medium denese. (Glacial Outwash)	20		
				14		
946.9	11.0			13		
			END OF BORING.			
			Water not observed while drilling.			
			Boring then backfilled.			

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1710632
GEOTECHNICAL EVALUATION
Hamburg Avenue Reconstruction
Lakeville Boulevard to 202nd Street (CSAH 50)
Lakeville, Minnesota

BORING: **ST-4**

LOCATION: See attached sketch.

DRILLER: B. Kammermeier | METHOD: 3 1/4" HSA, Autohammer | DATE: **10/27/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
955.6	0.0						
954.8	0.8	PAV	4 inches of bituminous over 6 inches of aggregate base.				
		FILL					
953.6	2.0		FILL: Clayey Sand, with Gravel, dark brown, wet.				
		SP-SM	POORLY GRADED SAND with SILT, fine-grained, trace Gravel, brown, wet, medium dense. (Glacial Outwash)	14		5	
				15			
				19			
				18			
944.6	11.0		END OF BORING.				
			Water not observed while drilling.				
			Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1710632
GEOTECHNICAL EVALUATION
Hamburg Avenue Reconstruction
Lakeville Boulevard to 202nd Street (CSAH 50)
Lakeville, Minnesota

BORING: **ST-5**

LOCATION: See attached sketch.

DRILLER: B. Kammermeier | METHOD: 3 1/4" HSA, Autohammer | DATE: **10/27/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
1030.3	0.0						
1029.9	0.4	SC/OL	CLAYEY SAND, trace roots, black, wet. (Topsoil)				
		OL	ORGANIC CLAY, trace roots, black, wet. (Topsoil)	7		28	OC=5%
1025.3	5.0	CL	SANDY LEAN CLAY, brown, wet, medium to rather stiff. (Glacial Till)	6			
				7			
				9			
1019.3	11.0		END OF BORING.				
			Water not observed while drilling.				
			Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2017\10632.GPJ BRAUN_V8_CURRENT.GDT 11/27/17 11:00

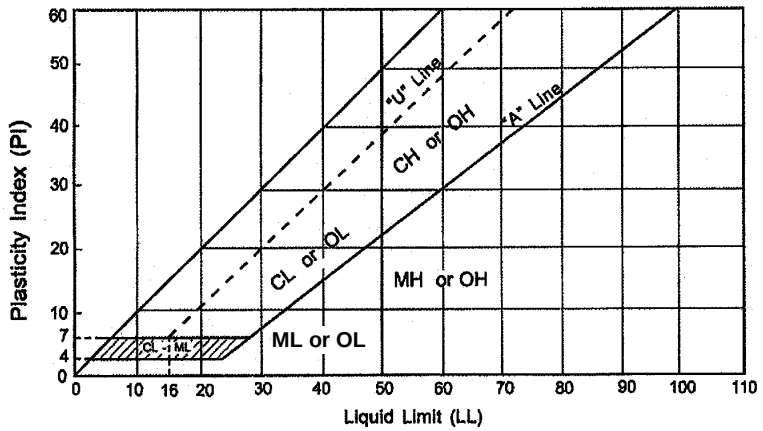
BRAUN INTERTEC

Descriptive Terminology of Soil

Standard D 2487
Classification of Soils for Engineering Purposes
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [a]				Soils Classification	
				Group Symbol	Group Name [b]
Coarse-grained Soils more than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines [e]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [c]	GW	Well-graded gravel [d]
			$C_u < 4$ and/or $1 > C_c > 3$ [c]	GP	Poorly graded gravel [d]
		Gravels with Fines More than 12% fines [e]	Fines classify as ML or MH	GM	Silty gravel [d f g]
			Fines classify as CL or CH	GC	Clayey gravel [d f g]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines [i]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [c]	SW	Well-graded sand [h]
			$C_u < 6$ and/or $1 > C_c > 3$ [c]	SP	Poorly graded sand [h]
		Sands with Fines More than 12% [i]	Fines classify as ML or MH	SM	Silty sand [f g h]
			Fines classify as CL or CH	SC	Clayey sand [f g h]
Fine-grained Soils 50% or more passed the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line [j]	CL	Lean clay [k l m]
			PI < 4 or plots below "A" line [j]	ML	Silt [k l m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [k l m n]
				OL	Organic silt [k l m o]
	Silts and clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay [k l m]
			PI plots below "A" line	MH	Elastic silt [k l m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [k l m p]
				OH	Organic silt [k l m q]
Highly Organic Soils	Primarily organic matter, dark in color and organic odor			PT	Peat

a. Based on the material passing the 3-inch (75mm) sieve.
b. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders or both" to group name.
c. $C_u = D_{60}/D_{10}$ $C_c = \frac{(D30)^2}{D_{10} \times D_{60}}$
d. If soil contains ≥15% sand, add "with sand" to group name.
e. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
f. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
g. If fines are organic, add "with organic fines: to group name.
h. If soil contains ≥15% gravel, add "with gravel" to group name.
i. Sand with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
j. If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 10 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
l. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
m. If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
n. PI ≥ 4 and plots on or above "A" line.
o. PI < 4 or plots below "A" line.
p. PI plots on or above "A" lines.
q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**OC**	Organic content, %
WD	Wet density, pcg	**S**	Percent of saturation, %
MC	Natural moisture content, %	**SG**	Specific gravity
LL	Liquid limit, %	**C**	Cohesion, psf
PL	Plastic limits, %	**Ø**	Angle of internal friction
PI	Plasticity index, %	**qu**	Unconfined compressive strength, psf
P200	% passing 200 sieve	**qp**	Pocket penetrometer strength, tsf

Particle Size Identification

Boulders	over 12"
Cobbles	3" to 12"
Gravel	
Coarse	3/4" to 3"
Fine	No. 4 to 3/4"
Sand	
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Silt	<No. 200, PI< 4 or below "A" line
Clay	<No. 200, PI ≥ 4 and on or about "A" line

Relative Density of Cohesionless Soils

Very Loose	0 to 4 BPF
Loose	5 to 10 BPF
Medium dense	11 to 30 PPF
Dense	31 to 50 BPF
Very dense	over 50 BPF

Consistency of Cohesive Soils

Very soft	0 to 1 BPF
Soft	2 to 3 BPF
Rather soft	4 to 5 BPF
Medium	6 to 8 BPF
Rather stiff	9 to 12 BPF
Stiff	13 to 16 BPF
Very stiff	17 to 30 BPF
Hard	over 30 BPF

Drilling Notes

Standard penetration test borings were advanced by 3 1/4" or 6 1/4" ID hollow-stem augers, unless noted otherwise. Jetting water was used to clean out auger prior to sampling only where indicated on logs. All samples were taken with the standard 2" OD split-tube samples, except where noted.

Power auger borings were advanced by 4" or 6" diameter continuous flight, solid-stern augers. Soil classifications and strata depths were inferred from disturbed samples augered to the surface, and are therefore, somewhat approximate.

Hand auger borings were advanced manually with a 1 1/2" or 3 1/4" diameter auger and were limited to the depth from which the auger could be manually withdrawn.

BPF: Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6" into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6" increments, and added to get BPF. Where they differed significantly, they are reported in the following form: 2/12 for the second and third 6" increments, respectively.

WH: WH indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WR: WR indicates the sampler penetrated soil under weight of rods alone; hammer weight, and driving not required.

TW: TW indicates thin-walled (undisturbed) tube sample.

Note: All tests were run in general accordance with applicable ASTM standards.

State Aid 10 Ton ESAL Traffic Forecast Calculator

This ESAL calculator is for use with default Heavy Commerical Traffic values; click "User Defined Traffic Values" sheet below if you wish to enter your own Heavy Commercial Traffic values.

Instructions: All yellow boxes require an input value.
Dropdown choices are provided for Base Year (C18), Number of Lanes (C19), and AADT Range (C20).
You must click on cells C18, C19, and C20 to access the dropdown choices.

General Information

Date	11/15/2017	
Forecast Performed by	NGL/Braun Intertec	
Name of County or City	Lakeville	
Project Number	--	
Project Description	Lakeville Blvd to 202nd St (CSAH 50)	
Route Number	MSAS 103	
Base Year (i.e. opening to traffic)	2018	
Number of Lanes (total both directions)	2 = typical 2 lane	
AADT Range	Urban: >1500	
Historical AADT (enter a minimum of two years)	**Year**	**AADT**
Enter oldest traffic data here	2015	1,650
Enter second oldest traffic data here	2035	1,995
Enter third oldest traffic data here		
Enter fourth oldest traffic data here		
Base Year AADT	2018	1,700
20-Year AADT	2038	2,050
35-Year AADT	2053	2,310
Growth Rate	1.03%	

Vehicle Type	Vehicle Class %	ESAL Factors Flexible	Rigid
2AX-6TIRE SU	1.52%	0.25	0.24
3AX+SU	0.46%	0.58	0.85
3AX TST	0.09%	0.39	0.37
4AX TST	0.12%	0.51	0.53
5AX+TST	0.89%	1.13	1.89
TR TR, BUSES	0.47%	0.57	0.74
TWIN TRAILERS	0.02%	2.40	2.33
Total	**3.57%**	**NA**	**NA**

20-Year Flexible Forecast (10 Ton) = 166,000
20-Year Rigid Forecast (10 Ton) = 236,000
35-Year Flexible Forecast (10 Ton) = 305,000
35-Year Rigid Forecast (10 Ton) = 432,000

For State Aid questions and information concerning this tool, please contact State Aid Pavement Engineer Joel Ulring at joel.ulring@state.mn.us or 651-366-3831.

Revised: 12/24/2014

MnPAVE Design Summary

MnPAVE 6.304 Simulation Input File: lakeville_hamburg.mpv
Confidence Level for Preliminary Life Estimate = 70%
Confidence and Reliability may not agree. Thickness and modulus are reduced when Confidence > 50%.
Monte Carlo Reliability randomly selects values for each layer. Use Reliability for final design.

Preliminary Life Estimate		20-Year Reliability (2,500 cycles)	
Fatigue	**Rutting**	**Fatigue**	**Rutting**
24 years	**>50 years**	**91.9%**	**100%**

Project Information

District	County	City
Metro	Dakota	Lakeville

Project Number	Route	Reference Post
--	Hamburg	from -- to --

Letting Date	Construction Type
11/16/17	RC

Designer	Soils Engineer
City of Lakeville	Braun Intertec

Climate Information

Seasons	Location
5	44˚ 39’ Latitude, 93˚ 3’ Longitude

Structural Information (Design Level: Intermediate)

Layer	Type	Subtype	Height (in.)
1	Hot-Mix Asphalt (Pb = 5.0%)	PG58-34 (2360F 1/2")	4.00
2	Aggregate Base	MnDOT Class 5	6.00
3	Aggregate Subbase	MnDOT Select Granular	24.00
4	Engineered Soil	R-Value = 20 (CL)	12.00
5	Undisturbed Soil	Engineered Soil Modulus/2	

Traffic Information (Speed = 30 mph)

Load Type	First Year ESAL	Growth Rate	Total Repetitions
ESAL	75,000	0% (simple)	1,500,000

Notes
Lakeville Blvd to 202nd

Reconstruction and widening

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